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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 18
SEPTEMBER 15, 1975

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior



VOLUME 8, NUMBER 18
SEPTEMBER 15, 1975

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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06 WATER RESOURCES PLANNING
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ABSTRACT SOURCES

2. WATER CYCLE

2A. General

FEEDBACK COUPLING OF ABSORBED SOLAR RADIATION BY THREE MODEL ATMOSPHERES WITH CLOUDS,
State Univ. of New York, Buffalo. Dept. of Biophysical Sciences.
For primary bibliographic entry see Field 2B.
W75-08982

COMPARATIVE EVALUATION OF THREE URBAN RUNOFF MODELS,
Canada Centre for Inlands Waters, Burlington (Ontario).
J. Marsalek, T. M. Dick, P. E. Wisner, and W. G. Clarke.
Water Resources Bulletin, Vol 11, No 2, p 306-328, April 1975. 3 fig, 7 tab, 13 ref, 1 append.

Descriptors: *Urban hydrology, *Urban runoff, *Urban drainage, *Mathematical models, Simulation analysis, Hydrology, Hydraulics, Hydrologic systems, Hydrographs, Hydraulic models, Computer models, Model studies, Evaluation, Watersheds(Basins).

Three urban runoff models, the Road Research Laboratory Model (RRLM), the Storm Water Management Model (SWMM), and the University of Cincinnati Urban Runoff Model (UCURM), were examined by comparing the model simulated hydrographs with the hydrographs measued on several instrumented urban watersheds. This comparison was done for the hydrograph peak points as well as for the entire hydrographs by using such statistical measures as the correlation coefficient, the special correlation coefficient, and the integral square error. The results indicated that, when applying the three selected noncalibrated models on small urban catchments, the SWM model performed marginally better than the RRL model and both these models were more accurate than the UCUR model. On larger watersheds, the comparisons between the SWM model and the other two models would be likely even more favorable for the SWM model, because it has the most advanced flow routing scheme among the studied models. (Terstriep-ISWS)
W75-08988

OPTIMIZING PARAMETERS FOR A WATERSHED MODEL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2E.
W75-09077

A DISCRETE KERNEL GENERATOR FOR STREAM-AQUIFER STUDIES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W75-09078

STREAMFLOW DEPLETION RESULTING FROM UPSTREAM SURFACE-WATER IMPOUNDMENT,
Geological Survey, Bay Saint Louis, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W75-09175

A NUMERICAL STUDY OF BOUNDARY EFFECTS ON CONCENTRATED VORTICES WITH APPLICATION TO TORNADOES AND WATERSPOUTS,
Edinburgh Univ. (Scotland). Dept. of Applied Mathematics.
For primary bibliographic entry see Field 2B.
W75-09194

SYSTEMS ANALYSIS OF HYDROLOGIC PROBLEMS.
Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan. 452 p.

Descriptors: *Conferences, *Hydrology, *Systems analysis, *Hydrologic systems, *Model studies, Simulation analysis, Stochastic processes, Statistical models, Synthesis, Synthetic hydrology, Water resources development, Estimating, Reservoir operation, Multiple-purpose reservoirs, Computer models, Analog models, Mathematical models, Urban drainage, Storm water, Probable maximum precipitation, Runoff, Streamflow, Statistical methods, Hydrologic aspects.

The seminar objectives were to study and examine the interrelationships between the various hydrologic processes and to emphasize application of the systems approach to hydrology. The broad subject areas discussed were: (1) nature of hydrologic systems, (2) description of hydrologic systems, (3) hydrologic system modeling techniques and devices, and (4) applications. (See W75-09211 thru W75-09228) (Humphreys-ISWS)
W75-09210

AN INTRODUCTION TO SYSTEMS ANALYSIS OF HYDROLOGICAL PROBLEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
V. T. Chow.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 15-41. 4 fig, 1 tab, 7 ref, 2 append.

Descriptors: *Systems analysis, *Rainfall-runoff relationships, *Analytical techniques, *Storage, *Decision making, Unit hydrographs, Hydrologic systems, Model studies, Hydrologic data, River basins.
Identifiers: *Nonlinear systems, Objective function.

Systems anslysis provides a modern tool for interpreting complex hydrological phenomena. Once a hydrologic system is identified, the hydrologic processes may be simulated theoretically or conceptually by mathematical models. Modeling is only a part of systems analysis, which should include other important processes such as design and decision. Systems analysis comprises system identification, system elements modeling, system objectives and constraints, and alternatives to system objectives. An example was given of the development of a generalized deterministic hydrologic system of a watershed response. The system storage was represented by a mathematical function of the input, rainfall, and the output, discharge, and their derivatives with respect to time. For a particular rainstrorm and its runoff, the coefficients were assumed constant, reducing the nonlinear equation to a linear form. After effecting a solution for the linear equation, the watershed storage was considered as nonlinear by expressing the coefficients as functions of the characteristic values of input and output. The proposed model was shown to produce satisfactory results from an analysis of hydrologic data for a number of watersheds. (See also W75-09210) (Singh-ISWS)
W75-09211

USE OF SYSTEM ANALYSIS APPROACH IN THE HYDROLOGICAL PROJECTS OF THE WORLD METEOROLOGICAL ORGANIZATION,
World Meteorological Organization, Geneva (Switzerland). Dept. of Hydrology and Water Resources.
J. Nemec.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 47-54. 10 ref.

Descriptors: *Systems analysis, *International Hydrological Decade, *Model studies, *Hydrology, Network design, Hydrologic aspects, Forecasting, Research and development, Research priorities, Foreign countries.

Application of systems analysis within the framework of World Meteorological Organization activities was discussed in general terms. These activities include network design for data collection, economic aspects of establishing and operating data collection networks, hydrological models for real-time forecasting, and intercomparison of conceptual hydrological models which are operational and use electonic computers (either digital, analog, or hybrid). (See also W75-09210) (Humphreys-ISWS)
W75-09212

THE UNITED STATES IHD PROGRAM,
National Committee for the International Hydrological Decade, Washington, D.C.
C. E. Downs.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 55-68.

Descriptors: *International Hydrological Decade, *Hydrology, *United States, Foreign countries, Research and development, Research priorities, Hydrologic aspects.

The history and structure of the International Hydrological Decade (IHD) at the international and national levels were reviewed, and examples of the U.S. program activities of some of the U.S. IHD work groups were discussed. The IHD program consists of: (1) studies of regional, continental, hemispheric, and global phenomena and processes; (2) studies in international basins polar regions, and/or involving orbiting satellites; (3) joint or coordinated work in two or more countries; and (4) studies of specific phenomena and processes of fundamental interest and wide usefulness. A major long-term objective of IHD is an estimate of the world water balance. Twelve international working groups were formed to study specific aspects of hydrology. The five catagories of the US IHD program are: (1) studies and investigations of national and regional large-scale water balances to be summarized in the National Water Atlas; (2) studies of hydrological processes in river, lake, and groundwater basins in differing environmental provinces, including those under progressively increasing human influence; (3) research in a variety of specific fields related to hydrological phenomena, processes, and methodology; (4) education and training, exchange of students, research scientists and professors, programs in graduate fellowships, and on the job training; and (5) supporting activities, including scientific communication, documentation, and liaison with participating countries, and the secretariat of the IHD coordinating council (UNESCO). The U.S./IHD program is centered around 13 work groups. (See also W75-09210) (Humphreys-ISWS)
W75-09213

HYDROLOGIC INSTRUMENTATION,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 7B.
W75-09214

SYSTEM EVALUATION - RELIABILITY OF DATA AND EXTRAPOLATION AND CORRELATION OF DATA,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 7A.

W75-09215

STOCHASTIC PROCESSES AND MODELS IN HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
V. Yevjevich.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 109-170. 32 fig.

Descriptors: *Stochastic processes, *Hydrologic systems, *Systems analysis, *Analytical techniques, *Time series analysis, Solar radiation, River flow, Flood data, Correlation analysis, Water resources, Hydrology, Model studies.
Identifiers: *Deterministic models, *Periodicities, Stationarity.

By changing the space scale on which a phenomenon is observed, the randomness may be either clearly shown or masked. Hydrologic phenomena are mostly stochastic although some contain systematic components of nature in the form of short-term periodicities. The era of determinism in hydrology can be seen by the search for deterministic functions to relate hydrologic random variables. The classical hydrologic research approach consisted of studying an individual environment as a system and its parts as subsystems. It is almost impossible to find a pure deterministic hydrologic process in nature. Hydrologic processes in time and space characteristics of hydrologic environments, are either stochastic processes or a combination of stochastic and deterministic components, mainly as periodic-stochastic or trend-stochastic processes. These stochastic processes for solar radiation and daily river flows were discussed as examples. The smaller the stochastic component in a process, the easier it is for studying, planning, and developing water resources. A study of the structure of a hydrologic process comprises three essentials: process analysis, process description in a concise mathematical form, and prediction. The stationarity of stochastic components of a process was stressed. Various estimators and indicators for incorporating stochastic components in models were described. (See also W75-09210) (Singh-ISWS)
W75-09216

MATHEMATICAL PROGRAMMING IN WATER RESOURCES,
Case Western Reserve Univ., Cleveland, Ohio. Systems Research Center.
Y. Y. Haimes.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 171-222. 9 fig, 4 tab, 4 ref.

Descriptors: *Systems analysis, *Simulation analysis, *Synthetic hydrology, Analytical techniques, *Dynamic programming, Hydrologic systems, *Linear programming, Operations research, Stochastic processes, Synthesis, Hydrology, Mathematical models, Water resources.

Following a general discussion of systems analysis, specific items were discussed. Topics covered in various degrees of detail included: linear, nonlinear, deterministic, probabilistic, static, and dynamic programming techniques; simulation techniques; and distributed versus lumped parameters. Several examples illustrated the discussion. (See also W75-09210) (Jess-ISWS)
W75-09217

GAME THEORY,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-09218

THE USE OF INPUT-OUTPUT (TRANSFER FUNCTION) MODELS IN HYDROLOGY,
California Univ., Davis. Dept. of Water Science and Engineering.
J. Amorocho.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 231-248. 3 fig, 16 ref.

Descriptors: *Input-output analysis, *Mathematical studies, *Hydrology, Mathematical models, Operations research, Systems analysis, Rainfall-runoff relationships, Statistical methods, Equations, Analytical techniques.

Summarized were the main principles involved in the use of hydrologic models of the input-output, or 'black box' type, as they are often called. It can be stated that so far it has never been possible to formulate any real hydrological situation in strictly deterministic terms because there is time variability of hydrologic systems due to man-made changes and to the natural processes of weathering erosion, climatic changes, etc., which constitute the geomorphological evolution of the land; there is uncertainty with respect to the magnitudes and the space and time distribution of the inputs and outputs of hydrologic systems, and with respect to the states and properties of their interior elements; and there are difficulties in the mathematical formulation of the complex nonlinear processes of mass and energy transfer that constitute the hydrologic cycle. The use of 'black box' analysis in hydrology is a very powerful method for modeling the behavior of natural-catchments, provided it is applied with an adequate understanding of its limitations. The principal of these is the structure of the rainfall field, and the degree to which it can be described by a lumped index function. When this description is plausible, the methods of nonlinear analysis provide a large improvement over the unit hydrograph concept for the prediction of runoff from rainfall. (See also W75-09210) (Jess-ISWS)
W75-09219

COMPUTER SIMULATION OF WATER RESOURCE SYSTEMS,
Utah Water Research Lab., Logan.
J. P. Riley.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 249-274. 13 fig, 14 ref.

Descriptors: *Simulation analysis, *Mathematical models, *Calibrations, *Computer models, *Water resources, Systems analysis, Hydrologic data, Runoff, Overland flow, Snowfall, Hydrology, Model studies.
Identifiers: *Sensitivity analysis, Distributed parameter model.

The problems of managing water resource systems are basically those of decision-making based on a consideration of the physical, economic, and sociological processes which are strongly interrelated and form a continuous, dynamic system. Once a prototype system is identified, the various processes in the system may be simulated by either physical or mathematical models. The mathematical representation of natural hydrologic systems may be achieved by means of either a lumped parameter model or a distributed parameter model. Computer simulation of water resource systems or models is a form of sysystems analysis. The systems approach is defined as a technique for examining the responses of a particular component complex which is subject to certain constraints and input functions. The development of a model for a system requires creation of a conceptual model and its transformation to a working mathematical model. Model verification, calibration, and testing form an integral part of the systematic development of a computer simulation model. A clear delineation of different purposes and objectives is a must for this approach. The effect of various management strategies and the sensitivity of system variables can be easily evaluated on the computer model. Some examples of computer simulation studies were given. (See also W75-09210) (Singh-ISWS)
W75-09220

THE SYNTHESIS OF HYDROLOGIC SYSTEMS ON THE ANALOG AND HYBRID COMPUTERS,
City Univ., London (England).
For primary bibliographic entry see Field 7C.
W75-09221

A PROBLEM ORIENTED LIBRARY FOR HYDROLOGY,
McMaster Univ., Hamilton (Ontario). Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 7C.
W75-09222

PRACTICAL APPLICATIONS OF HYDROLOGIC SIMULATION,
Hydrocomp International, Palo Alto, Calif.
For primary bibliographic entry see Field 4A.
W75-09223

CONTROL RULES FOR MULTIPLE-USE RESERVOIRS AND MULTI-RESERVOIR SYSTEMS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 4A.
W75-09224

A MATHEMATICAL MODEL OF URBAN STORM DRAINAGE,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 5D.
W75-09225

SOME PROBLEMS IN THE APPLICATION OF SYSTEMS ANALYSES IN WATER RESOURCES SYSTEMS,
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 3B.
W75-09226

DESIGN TYPHOON MODEL FOR ESTIMATION OF PROBABLE MAXIMUM PRECIPITATION AND PROBABLE MAXIMUM FLOOD IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-09227

SOCIAL ISSUES IN WATER RESOURCES DEVELOPMENT,
Utah State Univ., Logan. Dept. of Sociology.
For primary bibliographic entry see Field 6B.
W75-09228

BIBLIOGRAPHY OF HYDROLOGY, CANADA, 1971-1973.
National Research Council of Canada, Ottawa, Associate Committee on Feodesy and Geophysics.
For primary bibliographic entry see Field 10C.
W75-09288

2B. Precipitation

CLIMATIC MODIFICATION BY AIR POLLUTION, II: THE SAHELIAN EFFECT,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
R. A. Bryson.
Wisconsin University, Madison, Institute for Environmental Studies. Report 9, August, 1973. 12 p, 4 fig, 12 ref.

Descriptors: *Air pollution effects, *Arid climates, *Climatology, *Droughts, *Monsoons, *Africa, Deserts, Thermocline, Weather modification, Air pollution, Air temperature, Arid lands, Carbon dioxide, Climatic data, Dusts, Earth-air interfaces, Livestock, Mortality, Population, Rainfall, Seasonal, Turbidity, Variability, *Monsoons.
Identifiers: *Sahelian Zone, West Africa.

Severe drought has persisted more than 5 years within the Sahelian Zone, a broad belt of arid land some 3000 km along the southern edge of the Sahara Desert. Sharing the zone are the 6 countries of Mauritania, Senegal, Mali, Upper Volta, Niger, and Chad. Losses of human life and livestock have been staggering, for most of the population lives in the zone's southern region where formerly rainfall amounted to over 19 inches annually. Monsoon rains did not materialize in 1972 in West Africa, nor in any of the monsoon lands or lands with monsoon-like climates. Unfortunately, knowledge of the dynamics of the monsoons is still inadequate, and climatic data for the Sahel is rather limited. Technical data support the thesis that when the natural equator-to-pole and surface-to-upper air temperature differences are greater, desert-making climates move farther south, displacing the monsoons. Both carbon dioxide content and the amount of particulate matter suspended in the atmosphere (turbidity) affect these two gradients, and such pollutants have increased substantially over the last century, acting to supress the monsoons. In recent times the human contribution to temperature variance has amounted to perhaps 30 percent. With expected increasing volcanic activity, carbon dioxide, dust, and turbidity pollution from the rapidly industrializing human world population, it is not likely the monsoons will return with any regularity in this century. (Gloyd-Arizona)
W75-08949

THE OPACITY OF ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
J. N. Carras, and W. C. Macklin.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 203-206, April 1975. 3 fig, 5 ref.

Descriptors: *Instrumentation, Ice, *Hail, *Opacity, Optical properties, Bubbles, Freezing, Temperature, Laboratory equipment, Analytical techniques, Meteorology.
Identifiers: Wet growth(Hail), Dry growth(Hail), Ice layers, Light transmittance, Accreted ice.

A technique which yields quantitative measurement of the opacity of accreted ice deposits was described. This consists of determining the attenuation of a light beam as it passes through a thin section of the deposit, with the use of a photovoltaic cell as the detector. The transmittance of the deposits is related to the air bubble concentration, and the technique provides a useful supplementary method for analyzing the air bubble structures of hailstones. (Sims-ISWS)
W75-08974

CRYSTAL SIZE IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
P. J. Rye, and W. C. Macklin.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 207-215, April 1975. 6 fig, 16 ref.

Descriptors: *Ice, *Crystals, *Size, Crystallography, Crystal growth, Freezing, Temperature, Laboratory equipment, Drops(Fluids), Hail, Meteorology, Cloud physics.
Identifiers: *Crystallographic orientation, Accreted ice, Substrates.

Studies were made of the crystallographic orientation of 100 micrometer-radius supercooled droplets frozen on ice substrates whose c-axis orientations varied from 0 to 90 degrees to the surface normal. For a given droplet temperature and substrate orientation, there is a critical substrate temperature below which a frozen droplet has a high (greater than 0.8) probability of having an orientation which differes from that of the substrate. Above this critical substrate temperature there is a small (less than 0.2) residual probability of reorientation which is dependent on the droplet temperature and substrate orientation but independent of the substrate temperature. The lengths and maximum widths of ice crystals in accreted ice deposits have also been determined. In the dry growth regime there is a general decrease in the mean length from about 8 to 0.25 mm, and in the mean maximum width from about 1 to 0.2 mm, as the ambient temperature decreases from -5 to -30C. At ambient temperatures above -15C there is no dependence of the crystal dimensions on the temperature of the deposit. At ambient temperatures below this value, the crystal dimensions vary with deposit temperature in a manner consistent with the individual droplet studies. Consequently, measurements of the crystal dimensions in hailstone layers may give useful indications of their growth conditions. (Sims-ISWS)
W75-08975

A MEASUREMENT OF THE MIXING RATIO OF WATER VAPOUR FROM 15 TO 45 KM,
British Meteorological Office, Bracknell (England).
C. G. DeJonckheere.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 217-226, April 1975. 4 fig, 1 tab, 18 ref, append.

Descriptors: *Water vapor, *Instrumentation, *Infrared radiation, Measurement, Attenuation, Light, Meteorology, *Remote sensing.
Identifiers: *Stratosphere, Rockets, Mixing ratio.

The stratospheric water vapor altitude profile was derived from a measurement of the attenuation of solar infrared radiation at 2.61 micrometers by using a rocket-borne sensor. The solar zenith angle during the flight, which was made from Woomera in April 1970, was 98 degrees. The water vapor to air mixing ratio obtained was in the range 0.5 to 2 micrograms/gram in the lower stratosphere, with an upper limit of 4 micrograms/gram at 45 km. An appendix contains details of the calculation of theoretical attenuation. (Sims-ISWS)
W75-08976

FEEDBACK COUPLING OF ABSORBED SOLAR RADIATION BY THREE MODEL ATMOSPHERES WITH CLOUDS,
State Univ. of New York, Buffalo. Dept. of Biophysical Sciences.
R. L. Temkin, B. C. Weare, and F. M. Snell.
Journal of the Atmospheric Sciences, Vol 32, No 5, p 873-880, May 1975. 6 fig, 1 tab, 22 ref. N.I.H. Training Grant 5T01 GM00718.

Descriptors: *Models studies, *Atmosphere, *Clouds, Absorption, Solar radiation, Radiation, Cloud cover, Cloud physics, Mathematical models, Albedo, Optical properties, Meteorology, Temperature.

A study of the amount of solar radiation absorbed by the earth-atmosphere system as a function of the surface temperature was made comparing three model atmospheres with clouds. The atmospheres were generated by a model that involves a quasi-isentropic expansion of moist surface air of given relative humidity. 'Rainout' of condensate and the lapse rate were parameterized. The three atmospheres compared were a horizontally homogeneous diffuse thin cloud structure, a half-cloud half-clear structure, and a variable fractional cloud cover, each normalized to give the upper albedo at a reference point representative of global annual average conditions. Radiative transfer calculations were made by using the modified two-stream approximation and/or the Eddington approximation. The results indicate that with the diffuse thin cloud the magnitude of the feedback coupling of solar radiation absorbed to surface temperature lies intermediate to that of the other structures, with the variable fractional cloud showing the largest negative feedback. The negativity decreases with increasing surface reflectivity and may become positive at reflectivities representative of snow or ice. The negativity also decreases slightly with a decrease in zenith angle of the sun and with an increase in surface relative humidity. Implications of these results in global climatic modeling were discussed. (Sims-ISWS)
W75-08982

MEAN MERIDIONAL CIRCULATION IN THE SOUTHERN HEMISPHERE STRATOSPHERE BASED ON SATELLITE INFORMATION,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Sciences.
R. F. Adler.
Journal of the Atmospheric Sciences, Vol 32, No 5, p 893-898, May 1975. 7 fig, 2 tab, 12 ref. NASA Grant NGR 06-002-098, AEC Contract AT(11-1)-1340.

Descriptors: *Remote sensing, *Circulation, *Satellites(Artificial), Heat transfer, Heat budget, Winter, Radiation, Air circulation, Meteorology.
Identifiers: *Stratosphere, Southern Hemisphere, Vertical motion.

Atmospheric structure derived from satellite, multi-channel radiance data was used to calculate zonally-averaged vertical motions in the wintertime stratosphere of both hemispheres with a heat budget approach. The Northern Hemisphere calculations based on the satellite data were shown to compare favorably with a computation carried out with conventional data, and with results of previous studies. The mean Southern Hemisphere pattern for July 1969 indicates a high-latitude cell with the axis of sinking motion at approximately 50 degrees S, while the rising motion is centered at 70 degrees S. Thus, the antarctic stratospheric jet stream is associated with an indirect cell. Two individual 10-day periods from July 1969 were examined to compare the mean meridional circulation and eddy heat flux patterns in the Southern Hemisphere during a minor midwinter warming and during a quiet period. Large eddy fluxes at 60 degrees S and a strong indirect cell in the meridional circulation are associated with the minor warming. During the quiet period, eddy fluxes at 60 degrees S are relatively small and the mean meridional circulation appears to develop an additional cell in very high latitudes with sinking motion over the South Pole. (Sims-ISWS)
W75-08983

A THREE-DIMENSIONAL NUMERICAL MODEL OF AN ISOLATED DEEP CONVECTIVE CLOUD: PRELIMINARY RESULTS,
Wisconsin Univ., Madison. Dept. of Meteorology.
R. E. Schlesinger.
Journal of the Atmospheric Sciences, Vol 32, No 5, p 934-957, May 1975. 14 fig, 48 ref, 1 append. NSF Grant GI-31278X.

Descriptors: *Model studies, *Storms, *Convection, Clouds, Atmosphere, Air circulation, Thunderstorms, Cloud physics, Mathematical models, Computer models, Shear, Winds, Temperature, Advection, Meteorology, Buoyancy.
Identifiers: Veering, Liquid water content, Downdrafts.

The development of an isolated convective storm in a sheared environment was studied with an anelastic three-dimensional numerical model. Each grid cell has horizontal dimensions of Delta x = Delta y = 3.2 km and a vertical dimension of Delta z = 0.7 km. Although it is ultimately planned to use at least a 31x31x20 grid with turbulence and liquid precipitation included, an 11x11x8 trial grid was used with both of these processes suppressed, simulating only early cloud growth. Comparative experiments were run for three vertical profiles of ambient wind: no ambient wind, positive speed shear but no directional shear, and positive speed shear with veering. The cases were compared with regard to airflow, pressure, and thermal patterns. It was found that: (1) A vortex doublet develops at middle levels when ambient shear is present. A contributing factor may be tilting of horizontal vorticity into the vertical by differential vortex-tube lifting. (2) Shear introduces asymmetry, with upshear dominance of perturbation outflow and horizontal gradients of physical properties. (3) The perturbed pressure field exhibits a meso-low under the cloud, and a meso-high near its top. With shear, the meso-low is displaced downshear of the meso-high. (4) Thermal buoyancy and the vertical perturbed pressure gradient force are the dominant vertical forces, but strongly oppose each other. (5) With directional shear, the middle-level horizontal pressure gradient force is directed to the right of the direction of cloud motion, suggesting a potential propagation mechanism. (Sims-ISWS)
W75-08984

FIELD GENERATION AND DISSIPATION CURRENTS IN THUNDERCLOUDS AS A RESULT OF THE MOVEMENT OF CHARGED HYDROMETEORS,
State Univ. of New York, Albany. Atmospheric Sciences Research Center.
R. F. Griffiths, and J. Latham.
Journal of the Atmospheric Sciences, Vol 32, No 5, p 958-964, May 1975. 1 fig, 8 tab, 22 ref. NSF Grant AO 41166

Descriptors: *Electric fields, *Thunderstorms, *Hail, *Raindrops, Cloud physics, Precipitation(Atmospheric), Atmospheric physics, Electrical properties, Electrical coronas, Lightning, Meteorology, Storms.
Identifiers: *Atmospheric electricity, Cloud droplets, Current density, Charging current, Hydrometeors.

Calculations of the terminal velocities of charged hydrometeors in the presence of electric fields have formed the basis of computations of the charging current density flowing through a thundercloud as a result of the operation of a precipitative mechanism of cloud electrification. Values of the charging density were calculated for a range of values of field strength, precipitation rate, precipitation content, cloud water content, charge distribution, total separated charge, and the fraction of the small particles that have undergone a charging event. It was found that the estimated field required for the initiation of a lightning stroke (about 3.5 kV/cm) can be achieved only over a narrow range of conditions. The ease with which precipitative mechanisms can produce breakdown fields is considerably increased, however, if account is taken of spatial inhomogeneities in the field. (Sims-ISWS)
W75-08985

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH, PART 3 ATMOSPHERIC SCIENCES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09069

REMOVAL AND RESUSPENSION PROCESSES - WET REMOVAL PROCESSES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09073

CHARGE SEPARATION DUE TO WATER DROP AND CLOUD DROPLET INTERACTIONS IN AN ELECTRIC FIELD,
Durham Univ. (England). Dept. of Physics.
S. G. Jennings.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 227-233, April 1975. 3 fig, 1 tab, 14 ref.

Descriptors: *Electric fields, *Electrical studies, *Drops(Fluids), Electricity, Coalescence, Cloud physics, Electrical properties, Atmosphere, Clouds.
Identifiers: *Drop interactions.

Measurements were made of the electric charge acquired by drops of mean radius of about 750 microns, in the presence of a vertical electric field, the value of which could be varied from 4.5 to 27kV/m. It was found that the average charge acquired by the water drop as a consequence of the inductive process increased from 0.1fC to about 0.25fC as the electric field strength increased from 5kV/m to about 15kV/m, but thereafter decreased with increasing values of electric field. It was suggested that the collisions between polarized raindrops and cloud droplets in natural clouds could give rise, very effectively, to the production of electric fields of about 30kV/m; but that significantly larger fields could not be produced because all collisions in the higher fields would result in permanent coalescence. (Jones-ISWS)
W75-09193

A NUMERICAL STUDY OF BOUNDARY EFFECTS ON CONCENTRATED VORTICES WITH APPLICATION TO TORNADOES AND WATERSPOUTS,
Edinburgh Univ. (Scotland). Dept. of Applied Mathematics.
L. Bode, L. M. Leslie, and R. K. Smith.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 313-324, April 1975. 6 fig, 2 tab, 20 ref.

Descriptors: *Numerical analysis, *Boundary processes, *Vortices, *Tornadoes, Stress, Velocity, Flow friction, Drag.
Identifiers: *Flow parameters, *Waterspouts, Surface roughness.

The important role of boundaries on vortex behavior was investigated. Particular interest was focused on the boundary which is normal to the vortex core and 'behind' the body force. On this boundary the surface stress is related to the surface velocity by a drag coefficient C sub D and experiments were performed in which C sub D was infinite, unity, and zero, corresponding with a no-slip, a partially yielding, and a free-slip boundary, respectively. These calculations were motivated by the desire to assess what differences, if any, between tornadoes (which develop over land) and waterspouts (which develop over the sea) can be attributed to the different surface constraint. The effect on a vortex due to an abrupt change in surface condition was also studied as this is relevant to the behavior of a tornado which crosses a water surface, or even one which traverses ground with varying roughness characteristics, and conversely to the behavior of a waterspout which moves over land. The results accord with the behavior of laboratory vortices formed in air over surfaces of different roughness. They also appear consistent with observations concerning the behavior of a waterspout whose circulation decreased rapidly and visible funnel expanded during a traverse of about a kilometer over land and which subsequently reformed on moving back over water. (Jones-ISWS)
W75-09194

THE NATURE OF OROGRAPHIC RAIN AT WINTERTIME COLD FRONTS,
Royal Radar Establishment, Malvern (England). Meteorological Office Research Unit.
K. A. Browning, C. W. Pardoe, and F. F. Hill.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 428, p 333-352, April 1975. 15 fig, 1 tab, 13 ref.

Descriptors: *Precipitation(Atmospheric), *Orography, *Distribution patterns, Winter, Rainfall, Radiosondes, Topography, Ice, Crystals, Clouds, Cloud seeding, Forecasting, Radar, On-site investigations.
Identifiers: *Cold fronts, *Pre-frontal low-level jets, Liquid water content, Wales, England, British Isles.

Some of the largest falls of orographic rain in the western parts of the British Isles are associated with wintertime cold fronts. Four case studies of wet cold fronts were presented. They were all characterized by southwesterly prefrontal low-level jets but were widely different in other respects. The distribution of rainfall in England and Wales was analyzed by using a network of autographic raingages, specially augmented near the coast and over the hills of south Wales, and the orographic effects were explained by data from series of hourly rawinsonde ascents from a single station. The rain was considered in three distinct regions: pre-frontal, the surface cold front, and post-frontal. Behind the front, orographic effects were found to be well defined but rather slight. At the surface front, orographic effects were negligible, heavy rain tending to occur regardless of topography. Ahead of the front, orographic effects varied from small to very large, depending on the existence of a moist low-level feeder cloud and seeding particles. (Jones-ISWS)
W75-09195

COMPUTERIZED RAIN ASSESSMENT AND TRACKING OF SOUTH FLORIDA WEATHER RADAR ECHOES,
National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.
V. Wiggert, and S. Ostlund.
Bulletin American Meteorological Society, Vol 56, No 1, p 17-26, January 1975. 9 fig, 17 ref.

Descriptors: *Radar, *Precipitation(Atmospheric), *Instrumentation, Measurement, Computers, Rainfall, Cloud seeding, *Florida, Weather, Data collections, Data processing, Weather forecasting.

Weather radar power can be electronically assessed and digitally quantified within many small 'range bins.' The tape recorded output from a radar digitizer linked to the Miami WSR-57 is being processed post hoc by a sequence of computer programs written at the Experimental Meteorology Laboratory. One program assesses radar-derived rainfall rates and total rain volumes over preselected areas and for preselected time periods; another isolates and tracks radar echoes and, while so doing, calculates the rainfall from each echo as it grows, moves, splits, merges, or dies. Sample results were displayed and future applications discussed. (Jones-ISWS)

W75-09208

USE OF SYSTEM ANALYSIS APPROACH IN THE HYDROLOGICAL PROJECTS OF THE WORLD METEOROLOGICAL ORGANIZATION,
World Meteorological Organization, Geneva (Switzerland). Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2A.
W75-09212

DESIGN TYPHOON MODEL FOR ESTIMATION OF PROBABLE MAXIMUM PRECIPITATION AND PROBABLE MAXIMUM FLOOD IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
C. M. Wu.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 418-445. 12 fig, 8 tab, 7 ref, 3 append.

Descriptors: *Probable maximum precipitation, *Typhoons, *Orography, *Moisture content, *Circulation, Maximum probable flood, Unit hydrographs, Depth-area-duration analysis, Infiltration, Storm runoff, Model studies.
Identifiers: *Horizontal convergence, *Taiwan, Linear reservoir model.

At any watershed, peak flow caused by a typhoon depends upon the characteristics of the typhoon rainfall, especially the peak intensity and the rate of change in rainfall intensity near the peak, the moisture content, and the motion of the typhoon. A typhoon rainfall results from the ascending of saturated air induced by low-level horizontal convergence. In the mountainous region of Taiwan, orographic lifting plays a more important part than horizontal convergence in causing rainfall. Typhoon rainfall can be decomposed into two components: (1) circulation rainfall predicted from the continuity of moisture, and (2) orographic rainfall evaluated by dividing the atmosphere into several layers. The probable maximum flood is obtained by first estimating the probable maximum precipitation from the typhoon model, then computing the runoff volume by considering the infiltration factor, and finally preparing the hydrograph shape by applying the unit hydrograph principle. A linear reservoir model is adopted for deriving the unit hydrograph shape. The depth-duration-area curve is used for summarizing the quantitative characteristics of the recorded storms. (See also W75-09210) (Singh-ISWS)
W75-09227

WEATHER MODIFICATION GRANTS.
For primary bibliographic entry see Field 3B.
W75-09259

STUDY ON A SIGNIFICANT PRECIPITATION EPISODE IN THE WESTERN UNITED STATES,
National Weather Service, Salt Lake City, Utah. Western Region.
I. S. Brenner.
Available from National Technical Information Service, Springfield, Va 22161. NOAA Technical Memorandum NWS WR-98, April 1975. 36 p, 29 fig, 1 tab, 7 ref.

Descriptors: *Precipitation(Atmospheric), *Storms, *Clouds, *Dry seasons, Climatology, Atmosphere, Vortices, Satellites, Weather forecasting, Model studies, California.
Identifiers: *Extratropical system, *Subtropical system, Case analysis, Tropospheric perturbations, Troughs.

This synoptic study for the period 22 September to 3 October 1974 involves a case analysis of an unforeseen major precipitation episode associated with the merging of an inactive upper tropospheric perturbation that moved east-northeastward out of the subtropics and an inactive extratropical low, moving southeastward. The amalgamation of the two systems caused a major surface storm within 24 hours. The major impact of this storm was to bring an abrupt end to the California dry season. Effects of these systems can be disastrous if they occur 'unexpectedly' during the raisin-drying season. More documentation is needed to better define the characteristics and possible forecasting procedures required. (NOAA)
W75-09267

STORM TIDE FREQUENCY ANALYSIS FOR THE GULF COAST OF FLORIDA FROM CAPE SAN BLAS TO ST. PETERSBURG BEACH,
National Weather Service, Silver Spring, Md.
F. P. Ho, and R. J. Tracey.
Available from National Technical Information Service, Springfield, Va 22161. NOAA Technical Memorandum NWS HYDRO-20, April 1975. 34 p, 8 fig, 7 tab, 21 ref.

Descriptors: *Storms, *Tides, *Storm surge, Tropical cyclones, Water levels, Hurricanes, Hydrodynamics, Climatology, Model studies, *Florida, *Gulf of Mexico, *Frequency analysis.
Identifiers: *Storm tides, Tide frequency analysis, Storm surge models, Coastal profiles.

Storm tide height frequency distributions are developed for the Gulf coast of Florida from Cape San Blas to St. Petersburg Beach for the National Flood Insurance program. Storm tides are computed from a full set of climatologically representative hurricanes, using the National Weather Service hydrodynamic storm surge model. Tide levels are shown in coastal profile between annual frequencies of 0.10 and .002. This report is to be used in estimating actuarial risk to buildings from coastal floods and in land use management. (NOAA)
W75-09268

PARAMETERIZED MOISTURE AND HEAT FLUX THROUGH TOP OF BOMEX VOLUME,
National Weather Service, Silver Spring, Md.
V. A. Myers.
Available from the National Technical Information Service, Springfield, Va. 22161. NOAA Technical Memorandum EDS BOMAP-15, May 1975. 39 p, 13 fig, 7 tab, 11 ref.

Descriptors: *Oceans, *Tropical regions, *Moisture, *Enthalpy, *Mass, Fluctuations, Atmosphere, Thermodynamics, Oceanography, Meteorology.
Identifiers: BOMEX volume, Barbados, *Tropical oceans, Moisture flux, Enthalpy flux, Parameterization.

A prime objective of the Barbados Oceanographic and Meteorological Experiment (BOMEX) in 1969 was to determine the budgets of moisture, enthalpy, and mass in a fixed atmospheric volume over a tropical ocean. The fluxes through the top of the volume, approximately at 500 mb, were not measured directly. A parameterization scheme is developed to estimate the top-of-volume moisture flux as a ratio to rainfall produced. The enthalpy flux is also treated briefly. (NOAA)
W75-09272

QUANTIZING 3- AND 5-CM RADAR HURRICANE PRECIPITATION DATA,
Miami Univ., Coral Gables, Fla. Remote Sensing Lab.
For primary bibliographic entry see Field 7C.
W75-09276

HURRICANES ON THE TEXAS COAST: DESCRIPTION AND CLIMATOLOGY (1),
Texas A and M Univ., College Station. Center for Applied Geosciences.
W. K. Henry, and J. P. McCormack.
Report TAMU-SG-75-501, March 1975, 29 p. TAMU-SG-75-501.

Descriptors: *Hurricanes, *Tropical cyclones, *Coasts, Tornadoes, Winds, Storms, Floods, Storm surge, Precipitation, Climatology, Meteorology, Erosion, *Texas.
Identifiers: Wind damage, Cyclonic circulation.

This booklet is the first in a series of three prepared for publication by Texas A and M's Sea Grant Program. The series is designed to help Texans understand, prepar for, and recover from the harmful effects of hurricanes. Various types of tropical cyclones and hurricanes are described. The characteristics of hurricanes and their frequency of occurrence over sections of the Texas coast also are analyzed. (See also W75-09284) (NOAA)
W75-09283

HURRICANES ON THE TEXAS COAST: THE DESTRUCTION (2),
Texas A and M Univ., College Station. Center for Applied Geosciences.
W. K. Henry, D. M. Driscoll, and J. P. McCormack.
Report TAMU-SG-75-502, March 1975, 16 p. TAMU-SG-75-502.

Descriptors: *Hurricanes, *Tropical cyclones, *Coasts, *Disasters, Tornadoes, Winds, Storms, Floods, Storm surge, Precipitation, Erosion, Climatology, Meteorology, *Texas.
Identifiers: Wind damage, Hurricane-spawned tornadoes.

This booklet is the second in a series of three discussing tropical storms and hurricanes, and their effects. Types of damage a hurricane can cause along the Texas coast and adjacent, inland areas are described. Hurricane-related events, such as storm surge, heavy rains, high winds, tornadoes, and resulting hazards, such as floods and downed electrical wires, are discussed. Special emphasis is given to types of destruction that occurred during previous hurricanes. (See also W75-09283) (NOAA)
W75-09284

RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE.
National Weather Service, Silver Spring, Md.
Available from National Climatic Center, Asheville, NC 28801, for $0.75. Volume 2, 1973, 1974, 67 p.

Descriptors: *River forecasting, *Hydrologic data, *Rivers, *Forecasting, *Flood forecasting, Hydrology, Tables(Data), Warning systems, Floods, Water supply, Data aquisition, Surface waters, Flood control, *United States.

River forecasts and warnings, as well as other National Weather Service hydrologic services are described and information is given on: Hydrologic operations, forecasts and services; River Forecast Centers; NWS Field Offices; other hydrologic services; Data Acquisition Networks; Flash Flood Warning Program; Water Supply Forecasting Program; River Forecast Center addresses; River Forecast points and micellaneous information; Highest stages at National Weather Service gages; and Record high stages prior to Gage Records. Indexes are arranged by states, stations, and by rivers. A list of water supply forecast points is included. Illustrations included are: Map of River Forecast Centers, Map of Local NWS Offices, Map of Radar Network, Hydrologic Forecast System Chart, and Operations Chart - River and Flood Forecast and Warning Program. (NOAA)
W75-09285

WEATHER CONDITIONS AND SCREWWORM ACTIVITY,
National Weather Service, University Park, Pa.
For primary bibliographic entry see Field 3F.
W75-09318

2C. Snow, Ice, and Frost

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W75-08947

THE OPACITY OF ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
For primary bibliographic entry see Field 2B.
W75-08974

CRYSTAL SIZE IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
For primary bibliographic entry see Field 2B.
W75-08975

ISOTHERMS UNDER ICE,
For primary bibliographic entry see Field 2H.
W75-09011

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 3B.
W75-09198

A CONCEPTUAL MODEL OF OFFSHORE PERMAFROST,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2J.
W75-09266

EFFECTS OF ICE COVER ON DISSOLVED OXYGEN IN SILVER LAKE, ONTARIO,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
R. J. Maguire, and N. Watkin.
Technical Bulletin No 89, 3 p, 1975. 2 fig, 1 tab, 8 ref.

Descriptors: *Ice cover, *Dissolved oxygen, Ice-water interfaces, Chemicals, Investigations, Research, Iced lakes.
Identifiers: Silver lake, Ontario, Ice cover effects.

Weekly sampling was performed at the deepest point (23 m) of Silver Lake for a few chemical parameters during the late fall and winter of 1973-74. The amount of dissolved oxygen in most of the water column decreased by about 2 ppm during the winter. At the bottom, the decrease in dissolved oxygen amounted to 4-5 ppm, and the level of hydrogen sulfide increased signficantly. This decrease in the amount of dissolved oxygen is probably due to the prevention of atmospheric mixing by the ice and snow cover. In general, the amounts of orthophosphate, nitrate, chloride and total organic carbon remained constant during the winter, as did the values of specific conductance and pH. (Envir-Canada)
W75-09291

FLOATING ICE THICKNESS AND STRUCTURE DETERMINATION - HEATED WIRE,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
R. O. Ramseier, and R. J. Weaver.
Technical Bulletin No 88, 16 p, 1975. 10 fig, 8 ref.

Descriptors: *Ice cover, Methodology, Analytical techniques, Measurement, Instrumentation, Gages, Ice.
Identifiers: *Ice thickness, *Ice structure, *Heated wire technique.

The thickness of floating ice is one of the most important general parameters to be measured for many applications in the fields of transportation, engineering and climatology. The requirement for accurate thickness information, with details on the ice structure, led to the development and use of the heated wire ice thickness gauge. Once installed, the gauge provides a means of making in situ thickness measurements on fresh and salt water ice quickly and accurately. This report describes the measurement methods of determining ice structure from readings obtained, and details of construction of the gauge complete with engineering drawings. (Envir-Canada)
W75-09293

2D. Evaporation and Transpiration

EFFECTS OF ROOT MEDIUM AND WATERING ON TRANSPIRATION, GROWTH AND DEVELOPMENT OF GLASSHOUSE CROPS: I. EFFECTS OF COMPRESSION AT VARYING WATER LEVELS ON PHYSICAL STATE OF ROOT MEDIA AND A TRANSPIRATION AND GROWTH OF TOMATOES,
State Experiment Station Landvik, Grimstad (Norway).
G. Guttormsen.
Plant Soil. Vol 40, No 1, p 65-81, 1974, Illus.

Descriptors: *Plant growth, *Transpiration, Tomatoes, *Root systems, *Soil-water-plant relationships, Peat, Clays, Compaction, *Irrigation effects.
Identifiers: *Glasshouse crops, Montmorillonite.

The effect of adding clay, moisture and the compaction on the physical properties of peat as well as the effect on transpiration and growth of tomato plants were investigated during short term laboratory experiments. The effect of 6, 12 and 20 cm peat height in beds with constant water level was investigated in a 5-mo. tomato crop. Admixture of clay reduced the porosity of the peat. Adding the clay at moderate pressures (10, 100 g sq cm) decreased the amount of large pores (equivalent to pores emptied at pF 2.0) and to an increase of smaller pores (equivalent to pores emptied in the pF intervals 2.0-4.2). The reduction in the amount of large pores was greater with admixture of montmorillonite than with a soil clay. An increase of the soil clay content from 50 to 70% had an insignificant effect on the amount of large pores. Increasing the moisture content of the peat resulted in that fewer pores were emptied at pF 1.3. At a pressure of 1000 g sq cm the decrease of large pores was more marked for pure peat than for mixtures of peat and soil clay. Increasing the pressures from 10 to 100 g sq cm had only a slight effect. For a mixture of peat and montmorillonite a linear relationship was found between the clay content and bulk density, while a curvilinear relationship existed for a mixture of peat and soil clay. In short term laboratory experiments with tomato seedlings transpiration and growth rate were at a maximum at a pF equivalent to 20-30% airfilled pores. In a glasshouse experiment with tomatoes an increase was recorded in yield, size of fruit, leaf area and total dry matter production with increasing peat heights above a constant water level. Porous root media, such as peat, should be treated to counteract the existence of zones having suboptimal air content by use of sub-irrigation.--Copyright 1974, Biological Abstracts, Inc.
W75-09162

SIMULATION MODEL FOR EVAPOTRANSPIRATION OF WHEAT: EFFECT OF EVAPORATIVE CONDITIONS,
Hebrew Univ., Jerusalem (Israel).
G. Strateener, D. Yaron, E. Bresler, and D. Shimshi.
Journal of the Irrigation and Drainage Division, Proceeding of American Society of Civil Engineers, Vol 101, No IR1, Proceedings Paper 11169, p 13-19, March 1975. 4 tab, 3 ref, 2 append.

Descriptors: *Evapotranspiration, *Simulation analysis, *Agriculture, *Irrigation, *Wheat, Consumptive use, Soil moisture, Evaporation, Computers, Computer programs, Field capacity, Regression analysis, Plant growth, Root systems, Soil profiles, Model studies, Evaporation pans, Canopy.
Identifiers: *Israel(Negev).

A simulation model for tracing soil moisture fluctuations under irrigated wheat in a semi-arid climate was presented. The model was based on a function relating evapotranspiration to soil moisture and evaporative conditions as measured by means of a class A pan. The recharge of soil moisture by rain or irrigation was predicted by this model on the basis of a simplified infiltration scheme with the conventional concept of 'field capacity' as the upper limit of soil moisture content following the redistribution of moisture in the soil profile. By means of an iterative procedure, the 'best fitting' parameters were computed for each soil layer and each month from data on a wheat irrigation experiment in the arid Negev region in the year 1967-1968. The average relative deviation of the predicted soil moisture from the observed soil moisture was 9.3% for the five soil layers and 6.2% for the upper three soil layers. The reliability of the model was presented by these and other data and its performance was examined. (Roberts-ISWS)
W75-09196

RELATION OF SOIL WATER POTENTIAL TO STOMATAL RESISTANCE OF SOYBEAM,
Kansas State Univ., Manhattan. Evapotranspiration Lab.
R. A. Brady, S. M. Goltz, W. L. Powers, and E. T. Kanemasu.
Agronomy Journal, Vol 67, p 97-99, Jan-Feb 1975. 5 fig, 13 ref. OWRT A-049-KAN(9). 14-31-0001-3516.

Descriptors: *Evapotranspiration, *Soybeans, Soil water, Stomata, Measurement, Irrigation practices, Growth stages, Canopy, Leaves.
Identifiers: Water stress, *Stomatal resistance, *Soil water potential.

This research was undertaken to establish a meaningful relationship between stomatal resistance of soybeans and soil water potential. The main objectives were to establish this relationship and examine some of the factors affecting measurements of stomatal resistance of soybeans. Stomatal resistance in the soybean leaves was measured with a stomata porometer and plotted against soil water potential. A definite relationship was determined in two consecutive growing seasons between the soil water potential and stomatal resistance. Adaxial stomatal resistance increased rapidly when soil water potentials decrease to near -4 bars. Stomatal resistance of upper canopy leaves was not affected by the physiological stage of growth of the whole plant. The difference in stomatal resistance of well-irrigated and nonirrigated soybeans was distinct, and stomatal resistance showed promise in determining irrigation schedules.
W75-09235

ON CHANGES OF TRANSPIRATIONAL RESISTANCE IN LEAVES OF FITTONIA AS A RESULT OF DIFFERENT HUMIDITY, (IN GERMAN),
Basel Univ. (Switzerland). Botanisches Institut.
J. Burckhardt.
Ber Schweiz Bot Ges, Vol 82, No 4, p 309-338, 1972. Illus. English summary.

Descriptors: Transpiration, *Plant physiology, Environmental effects, Plant growth, *Stomata, *Transpiration control.
Identifiers: Fittonia-argyroneura, Mesophyll.

Formulas were devised for water vapor and heat transfer coefficients as functions of wind velocity, and length and width of a filter paper leaf-model. Fittonia argyroneura Coem., cuttings with adventitious roots, cultivated in nutrient solution were used for the experiments. The measurements were all performed in the dark. (30C, wind velocity = 0.4 m/s). The plants were exposed to selected antecedents, (A) induced wind velocity 0 m/s, relative air humidity 25%, air temperature 30C, liminious flux density 3000 Lux or 0 Lux, and (B) induced wind velocity 0 m/s, relative air humidity greater than 80%, air temperature 30C, luminious flux density 3000 Lux or 0 Lux. Their effects on the single transpiration resistances were examined. According to their antecedents the plants reached similar final values for the total diffusion resistances Sigma R regardless of the initial values. (Antecedents A) produced relatively high, antecedents B) relatively low total resistances.) These processes were reversible. Sudden changes of the total resistance were interpreted as a regulatory function of the stomata. On the other hand the principal level of the transpiration was adjusted by the 'cuticular' possible to prove the variability of RMIu directly. There is considerable evidence that the plant tries to keep it transpiration-level constant by changing its resistances, e.g. antecedents B), by opening the stomata in the dark. The observed oscillations of Sigma R were discussed as a regulatory function of the stomata, the oscillation was induced by the water economy. Exposing the leaves to light superimposed an 'opening order' to the stomata upon the 'order' of the water economy. The periodic opening and closing of the stomata was explained by the alternating requirements of the CO2- and O2-exchanges and the water economy.--Copyright 1974, Biological Abstracts, Inc.
W75-09330

2E. Streamflow and Runoff

HYDROLOGIC UNIT MAP--1974, STATE OF MICHIGAN.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08916

HYDROLOGIC UNIT MAP--1974, STATE OF SOUTH CAROLINA.
Geologic Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08917

HYDROLOGIC UNIT MAP--1974, STATE OF VIRGINIA.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08918

HYDROLOGIC UNIT MAP--1974, STATE OF ALABAMA.
Geological Survey, Reston, Va.
For sale by USGS, Reston, Va 22092, Price $1.00. Hydrologic Unit Map of Alabama, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *Alabama, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Alabama that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W75-08919

HYDROLOGIC UNIT MAP--1974, STATE OF NEW YORK.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08920

A NEW DEVELOPMENT IN FLOOD FREQUENCY ESTIMATION,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia).
W. C. Boughton.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 31 - 35, May 1975. 5 fig, 3 tab, 8 ref.

Descriptors: *Flood frequency, *Daily hydrographs, *Frequency analysis, Estimating, Peak discharge, Flood recurrence intervals, Rainfall-runoff relationships, Watersheds(Basins), *Australia.
Identifiers: *Queensland(Australia).

Peak flood flows are highly correlated with the daily flows in which they occur, and this relationship is used to develop a method of extending short flood records. The frequency distribution of daily flows, estimated from daily rainfalls by a rainfall-runoff model, is used with the short flood record to estimate the long term distribution of floods. Tests were made on 8 catchments, 67 to 505 square miles in area, in Queensland, Australia, using 10 years of streamflow record in each case with daily rainfalls to estimate 30 to 35 years of floods. Log-normal and Log-Pearson III distributions were fitted to both estimated and actual flood series. The estimated 1 in 50 years and 1 in 100 years floods differed on average by less than 8% from the actual records. (CSIRO)
W75-08957

COMPARISON OF UNIT HYDROGRAPH AND RUNOFF ROUTING METHODS OF FLOOD ESTIMATION,
Monash Univ., Clayton (Australia).
E. M. Laurenson, and R. G. Mein.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 36 - 40, May 1975. 4 fig, 9 ref.

Descriptors: *Unit hydrographs, *Routing, *Runoff forecasting, Hydrograph analysis, Streamflow forecasting, Rainfall-runoff relationships, Design flood, Watersheds(Basins), *Australia.
Identifiers: Yarra River(Vic), Thomson River(Vic), South Creek(NSW).

The unitgraph method of flood estimation is highly respected, but it nevertheless shows some inherent difficulties: notably, it neglects both areal variability of rainfall and losses over a catchment, and non-linearity of catchment response over a range of excess rainfall. The runoff routing method overcomes these and other limitations at the expense only of more extensive catchment analysis and computation. These points are explained and demonstrated with particular reference to the results of comparative applications of the two methods on three Australian catchments. (CSIRO)
W75-08958

DEVELOPMENT OF REGIONAL FLOOD ESTIMATION PROCEDURES,
Cameron, McNamara and Partners, Brisbane (Australia).
For primary bibliographic entry see Field 4A.
W75-08959

A FLOW AND SALT TRANSPORT SIMULATION SYSTEM FOR THE RIVER MURRAY IN SOUTH AUSTRALIA,
South Australia Engineering and Water Supply Dept., Adelaide.
For primary bibliographic entry see Field 7C.
W75-08960

ELECTROMAGNETIC FLOW SENSORS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 7B.
W75-08987

OPTIMIZING PARAMETERS FOR A WATERSHED MODEL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
V. O. Shanholtz, and J. C. Carr.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 18, No 2, p 307-311, March-April 1975. 4 fig, 3 tab, 9 ref. OWRT A-018-VA(7).

Descriptors: *Model studies, *Simulation analysis, *Computer models, Optimization, Hydrology, Analytical techniques, Hydrologic aspects, Runoff, Mathematical models, Mathematics, Watersheds(Basins), Parametric hydrology.
Identifiers: *Kentucky Watershed Model.

Use of the Kentucky Watershed Model and experimentation with various land phase parameters were discussed. Examples were presented demonstrating the year-to-year parameter variation and the effect of including additional records. Potential errors due to unrepresentative, short periods of record were also discussed. When longer historical records were available, new criteria for selecting representative input data were presented. (Jess-ISWS)
W75-09077

FLOOD PLAIN INFORMATION; TUCKAHOE CREEK, HENRICO COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
July 1965, 11 p, 3 plates, 3 fig; append, 24 p, 6 plates, photos, 2 tab, 24 ref.

Descriptors: *Flood plains, *Flood damage, *Flood plain zoning, Flood profiles, Flood stages, Flood proofing, Obstruction to flow, Land use, Planning, Urbanization, *Virginia.
Identifiers: *Tuckahoe Creek(Va), *Deep Run(Va), Stony Run(Va), Henrico County(Va), Flood plain management, '50-year flood', Standard Project Flood.

Although now sparsely populated, the portion of Henrico County, Virginia, in the study area is being rapidly developed as Richmond expands to the west. Much of the flood plain is low and swampy. The stream channels are relatively shallow and overgrown with dense vegetation. During a flood, the vegetation along with 7 bridges would create obstructions to flow. Rainfall averages 43 inches per year and is greatest in the summer. Based on rainfall and flow records of surrounding streams, peak flows for a '50-year flood' and a Standard Project Flood (SPF) were computed. At the C and O Railroad, the point of highest peak discharge, a '50-year flood' would produce 11,360 cfs and an SPF 29,200 cfs. Guidelines for use of floodplains and reducing future flood losses are discussed, including floodplain zoning, building codes, subdivision regulations, floodplain evacuation, flood proofing, flood control works, and alternative sites and alternative uses. (Diefendorf-North Carolina)

W75-09115

FLOODS IN WAIAHOLE-WAIKANE AREA, OAHU, HAWAII,
Geological Survey, Reston, Va.
C. J. Ewart, and R. Lee.
For sale by US Geological Survey, Reston, Va. 22092 - $1.25. Hydrologic Investigations Atlas HA-531, 1974. 1 sheet, 7 fig, 1 map, 8 ref.

Descriptors: *Floods, *Flood frequency, *Flood data, *Maps, *Hawaii, Flood profiles, Flood peak, Flood plains, Flood protection, Flood forecasting, Hydrograph analysis, Streamflow.
Identifiers: *Oahu(Hawaii), Waiahole-Waikane area.

This one-sheet atlas presents hydrologic data concerning the extent and frequency of flooding in the Waiahole-Waikane area of windward Oahu, Hawaii. The data provide a technical basis for the formulation of flood-plain regulations, building and zoning ordinances, the design and location of flood-control projects, and modification or improvement of the existing drainage system. The three main streams in the study area are Waiahole, Waikane, and a smaller unnamed stream, which is located between these two. Waiahole and Waikane Streams head near the crest of the Koolau Range and are perennial; the unnamed stream heads at about the 700-foot elevation and is intermittent. The stream gradients are steep in the upper reaches and fairly flat on the coastal flood plain. The approximate area subject to inundation by a flood having an estimated recurrence interval of 50 years is outlined on a topographic map. The major part of the inundated area is the lowland between Waiahole and Waikane Streams. (Woodard-USGS)
W75-09169

FLOODS IN EAST BATON ROUGE PARISH AND ADJACENT AREAS, LOUISIANA, FOR THE PERIOD 1953-74,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 4A.
W75-09173

STREAMFLOW DEPLETION RESULTING FROM UPSTREAM SURFACE-WATER IMPOUNDMENT,
Geological Survey, Bay Saint Louis, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W75-09175

WATER RESOURCES DATA FOR KANSAS, 1974: PART 1. SURFACE WATER RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 7C.
W75-09180

AN INTRODUCTION TO SYSTEMS ANALYSIS OF HYDROLOGICAL PROBLEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-09211

MATHEMATICAL MODELING OF NEAR COASTAL CIRCULATION,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2L.
W75-09273

RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE.
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2B.
W75-09285

FLOOD OF JUNE 1972 IN THE SOUTHERN PEACE (SMOKY RIVER) BASIN, ALBERTA,
Department of the Environment, Calgary (Alberta). Water Resources Branch.
For primary bibliographic entry see Field 4A.
W75-09292

2F. Groundwater

AVAILABILITY AND QUALITY OF GROUND WATER IN THE SUTHERLIN AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 7C.
W75-08910

SOURCES OF EMERGENCY WATER SUPPLIES IN SAN MATEO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 6D.
W75-08911

GROUND WATER IN GRAY COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08915

MODELLING A GROUNDWATER AQUIFER IN THE GRAND PRAIRIE OF ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
C. L. Griffis.
Transactions of the American Society of Agricultural Engineers, Vol 15, No 2, p 261-263, March-April 1972. 6 fig, 5 ref. OWRR A-020-ARK(1).

Descriptors: *Groundwater, *Computer models, *Mathematical models, Aquifer management, Groundwater recharge, Recharge wells, Artificial recharge, Water yield, Surface-groundwater relationships, Aquifers, *Arkansas, Model studies.
Identifiers: Quaternary aquifer(Ark), Grand Prairie(Ark).

Most of the irrigation water for the Grand Prairie of Arkansas comes from the Quaternary aquifer lying beneath the area. Constant pumping has lowered the water table and shortened the water supply. A model was developed to investigate the possibility of artificial recharging of the aquifer. The area was divided into sections of one square mile. The flow equations were then solved for each section. Various methods of recharge were then evaluated using the model. Recharge wells were found to provide the best solution. (Skogerboe-Colorado State)
W75-08923

THE APPLICATION OF THE DSDT HYBRID COMPUTER METHOD TO WATER RESOURCES PROBLEMS,
California Univ., Los Angeles. School of Engineering and Applied Science.
W. J. Karplus, and J. A. Dracup.
Paper at Proceedings, 8th Annual Water Resource Conference, Rollo, Missouri, October, 1972. 7 ref. (California Water Resources Center Project UCAL-WRC-W-340). OWRR B-150-CAL(9).

Descriptors: *Computer models, *Simulation analysis, *Mathematical models, Reviews, *Hybrid computers, Analog models, *Groundwater.

The progressive evolution of the Discrete-Space-Discrete-Time Hybrid Computer System and application of the system in simulating ground-water systems is reviewed. The review demonstrates that a variety of hydrology problems can be treated successfully using the analog subroutine approach. Advantages and disadvantages of the system are presented together with literature citations of the specific applications of the system. (Snyder-California, Davis)
W75-08929

THE USE OF THE DIGITAL SIMULATION LANGUAGE PDEL IN HYDROLOGIC STUDIES,
California Univ., Los Angeles. Dept. of Computer Science.
W. C. Tam, and W. J. Karplus.
Water Resources Bulletin, Vol 9, December 1973, p 1100-1111. 10 fig, 5 ref. (California Water Resources Center Project UCAL-WRC-W-340). OWRR B-150-CAL(12).

Descriptors: *Simulation analysis, *Hydrologic models, Mathematical models, *Groundwater, *Programming language, Digital computers, Computer programs, Aquifers, Percolation.

Digital simulation languages have become popular means for the simulation and analysis of systems on a digital computer. However, the use of these languages for the simulation of systems characterized by partial differential equations has been very limited. In hydrologic studies, mathematical models involving elliptic and parabolic partial differential equations are most common. This paper describes the application of the digital simulation language PDEL to analyze problems in hydrologic studies. PDEL is designed specifically to solve partial differential equations of the elliptic, parabolic, and hyperbolic types. The language provides convenient and easy-to-learn statements for the description of problem to the computer. A computer program is automatically generated to solve the problem and the numerical solution printed and plotted. Two important hydrologic problems are used for illustration. The first is the analysis of ground-water table recession in large unconfined aquifers and the second is the growth of ground-water mounds in response to uniform percolation. (Snyder-California, Davis)
W75-08930

ESTIMATION OF THE WATER RESOURCES OF A PORTION OF THE GAMBIER PLAIN SOUTH AUSTRALIA USING A NEW METHOD FOR EVALUATING LOCAL RECHARGE,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
G. B. Allison.
In: Hydrology Symposium, Armidale, Australia, 1975. Institution of Engineers Australia, Preprints of Papers, p 1 - 5, May 1975. 3 fig, 1 tab, 19 ref.

Descriptors: *Groundwater recharge, *Tritium, *Vegetation effects, *Soil types, Estimating, Radioisotopes, Pasture, Forests, Planning, Water resources development, *Australia.
Identifiers: Gambier Plain(SA).

A technique for estimating local recharge to an unconfined aquifer using environmental tritium is outlined. For four different soil types in the same climatic regime, local recharge was found to vary between 50 and 180 mm per year beneath pasture. Lesser recharge occurs by a different mechanism beneath native forest. The estimates of local recharge together with an approximate soil map are used to estimate that the mean local recharge to the aquifer is approximately 150,000,000 cu. m. per year. Some implications for future planning of the variation in local recharge with soil type are discussed. (CSIRO)
W75-08953

INVESTIGATION OF SENSITIVITY AND ERROR PROPAGATION IN NUMERICAL MODELS OF GROUNDWATER BASINS,
James Cook Univ. of North Queensland, Townsville (Australia).
R. E. Volker, and B. E. Guvanasen.

In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 16 - 20, May 1975. 6 fig, 1 tab, 10 ref.

Descriptors: *Mathematical models, *Groundwater movement, Numerical analysis, Model studies, Equations, Aquifer characteristics.

A description is given of a series of numerical experiments to study patterns of error propagation produced by inaccuracy of data in digital models of groundwater basins. The results show that errors in initial head data will usually be of most significance in short term predictions although the consequent discrepancies will decrease with time. Errors in predicted heads resulting from incorrect transmissivity and storage coefficient data tend to increase with time and will therefore cause problems in using models for long term predictions of aquifer response. (CSIRO)
W75-08954

TECHNIQUES FOR HANDLING INPUT DATA FOR FINITE ELEMENT ANALYSIS OF REGIONAL GROUNDWATER FLOW,
New South Wales Univ., Kensington (Australia). Water Research Lab.
P. S. Huyakorn, and C. R. Dudgeon.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 21-25, May 1975. 10 fig, 14 ref.

Descriptors: *Finite element analysis, *Data processing, *Computer programs, *Groundwater movement, Groundwater basins, Numerical analysis.

Techniques are presented which enable a significant proportion of the input data for finite element analysis of regional groundwater flow problems to be automatically generated. A computer program incorporating these techniques is described. Salient features of the program include subroutines which plot the generated input data and computed results. Through visual inspection of the plots, errors in the input data can be readily detected and rectified. (CSIRO)
W75-08955

FACTORS CONTROLLED POROSITY AND PERMEABILITY IN THE CURDSVILLE MEMBER OF THE LEXINGTON LIMESTONE,
Kentucky Water Resources Inst. Lexington.
W. C. MacQuown, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-242 987, $4.75 in paper copy, $2.25 in microfiche. Research Report No 7, 1967. 80 p, 19 fig, 5 tab, 13 ref. OWRR A-003-KY. 14-01-0001-911.

Descriptors: *Porosity, *Permeability, *Kentucky, *Carbonates, Carbonate rocks, *Limestones, Hydrogeology, Aquifers, Groundwater.
Identifiers: Carbonate porosity, Carbonate permeability, Carbonate aquifer, Limestone aquifer, Curdsville limestone, Carbonate petrology, Carbonate lithology, Carbonate bank facies.

Factors controlling the porosity and peameability of the Curdsville Limestone Member of the Lexington Limestone of Middle Ordovician Age in the Blue Grass Region of Kentucky are geological. Microstratigraphic analysis has led to the division of the lower Lexington Limestone, consisting principally of the Curdsville Member into three beds which may be subdivided into 'zones' made up of several lithological types and sub-types. Lower, middle, and upper bed characteristics are helpful in determining the regional dispositional history in the progressively transgressing Curdsville sea. Paleogeography of Curdsville time has been determined by delineation of two local facies: (1) a carbonate bank--shoal area facies, and (2) a shelf--channel area facies. Permeable carbonate bank--shoal facies are best developed on the structurally high Jessamine Dome Shoal Area where the Curdsville Limestone is found at shallow depth. Ground waters of meteoric origin have created sink holes, solution valleys, and caverns through solution enlargement of fractures comprising an extensive intersecting joint system. (Huffsey-Kentucky)
W75-09051

A DISCRETE KERNEL GENERATOR FOR STREAM-AQUIFER STUDIES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W75-09078

GEOPHYSICAL EXPLORATION OF GROUNDWATER IN SOFT FORMATIONS AND ITS UTILIZATION IN MINOR IRRIGATION,
Indian Inst. of Tech., Kharagpur. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 4B.
W75-09103

DIGITAL MODEL ANALYSIS OF THE PRINCIPAL ARTESIAN AQUIFER, GLYNN COUNTY, GEORGIA,
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W75-09171

A GALERKIN-FINITE ELEMENT ANALYSIS OF THE HYDROTHERMAL SYSTEM AT WAIRAKEI, NEW ZEALAND,
Geological Survey, Reston, Va.
J. W. Mercer, G. F. Pinder, and I. G. Donaldson.
Journal of Geophysical Research, Vol 80, No 17, p 2608-2621, June 10, 1975. 15 fig, 3 tab, 64 ref.

Descriptors: *Geothermal studies, *Mathematical studies, *Numerical analysis, *Finite element analysis, Foreign research, Borehole geophysics, Thermal water, Confined water, Forecasting, Heat flow, Thermal properties, Preesure, Temperature, Porous media, Aquifer characteristics, Correlation analysis, Groundwater movement.
Identifiers: *New Zealand, Two-dimensional areal analysis, Three-dimensional flow.

A single-phase simulation model was applied to the hot-water hydrothermal field at Wairakei, New Zealand. A two-dimensional areal analysis was made of the production aquifer under steady state and transient flow conditions, allowing vertical flow of heat and fluid through an overlying confining bed. Calculated temperature and pressure patterns correlate well with observed patterns until approximately 1963, when increasing quantities of stream in the production aquifer invalidated the assumption of single-phase flow. For futher simulation of the Wairakei reservoir the numerical model will need to be extended to incorporate phase change and three-dimensional flow. Preliminary results, however, indicate that the response of hot-water hydrothermal systems to exploitation can be simulated by using a mathematical reservoir model based on a Galerkin-finite element approach. (Woodard-USGS)
W75-09176

HYDRAULIC CHARACTERISTICS AND WATER-SUPPLY POTENTIAL OF THE AQUIFERS IN THE VICINITY OF THE WASTE-WATER TREATMENT PLANT, SOUTH BEND, INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4B.
W75-09179

PROBLEMS IN C-14 DATING OF WATER FROM AQUIFERS OF DELTAIC ORIGIN--AN EXAMPLE FROM THE NEW JERSEY COASTAL PLAIN,
Geological Survey, Reston, Va.
I. J. Winograd, and G. M. Farlekas.
In: Isotope Techniques in Groundwater Hydrology 1974, Vol 2; Proceedings of Symposium organized by International Atomic Energy Agency, March 11-15, 1974, Vienna: International Atomic Energy Agency Publication, Vienna, p 69-93, August 1974. 8 fig, 2 tab, 28 ref.

Descriptors: *Radioactive dating, *Carbon radioisotopes, *Groundwater, *Aquifers, *New Jersey, Dating, Methodology, Geologic time, Geochemistry, Groundwater movement, Sedimentology, Evaluation, Coastal plains.
Identifiers: *Potomac-Raritan-Magothy aquifer(NJ), Deltaic sediments, Marginal marine sediments.

Major assumptions common to interpretive studies of C-14 in groundwater systems are: (a) no CO_2 is introduced after recharge; (b) the C-13 of carbonate phases in the aquifer is known and taken to be zero per mil; and (c) interformational flow can be neglected. None of these assumptions are fulfilled in deltaic and marginal marine sediments comprising the Potomac-Raritan-Magothy aquifer system of New Jersey; and it is likely that the first two cannot be met in most aquifers of deltaic to marginal marine origin because: (1) variations of pH, H_2CO_3, HCO_3, and Ca+Mg in the groundwater show a significant amount of CO_2 being generated within the Potomac-Raritan-Magothy aquifer to distances of 45 kilometers down the hydraulic gradient. The hypothesis that coalification of ubiquitous lignitic detritus is the source of CO_2 described in other deltaic aquifers is tentatively accepted here; (2) the C-13 of common carbonate mineral phases in deltaic and marginal marine sediments ranges from 0 to -20 per mil; (3) the aquifer is recharged both by infiltration on its outcrop areas and by leakage from overlying marine strata; the leakage is significantly more mineralized than the aquifer water; the C-14 content probably also differs. For these reasons, and despite regular variations of C-14 and C-13 down the hydraulic gradient, meaningful interpretation of even relative C-14 ages and groundwater velocities cannot be made in the New Jersey aquifer. (Woodard-USGS)
W75-09183

HYDROLOGIC CONSEQUENCES OF USING GROUND WATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W75-09184

GROUND-WATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 6D.
W75-09185

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE TEHAMA-COLUSA CANAL SERVICE AREA, SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-09187

ESTIMATED GROUND-WATER FLOW, VOLUME OF WATER IN STORAGE, AND POTENTIAL YIELD OF WELLS IN THE POJOAQUE RIVER DRAINAGE BASINS, SANTA FE COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N.Mex.
For primary bibliographic entry see Field 4B.
W75-09188

THE INFLUENCE OF LATE CENOZOIC STRATIGRAPHY ON DISTRIBUTION OF IMPOUNDMENT-RELATED SEISMICITY AT LAKE MEAD, NEVADA-ARIZONA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W75-09192

2G. Water In Soils

CONTENT OF THE TRACE ELEMENTS COPPER AND MANGANESE IN STREAM WATER, SOIL, AND PLANTS IN SOUTHERN UKRAINE, (IN RUSSIAN),
Odesskii Meditinskii Institut (USSR).
For primary bibliographic entry see Field 5B.
W75-08907

CHARACTERIZATION OF THE FOREST FLOOR IN STANDS ALONG A MOISTURE GRADIENT IN SOUTHERN NEW MEXICO,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
A. G. Wollum, II.
Soil Science Society of America, Proceedings, Vol 37, No 4, p 637-640, July-August, 1973. 5 tab, 13 ref.

Descriptors: *New Mexico, *Forest watersheds, *Soil moisture, *Moisture availability, *Soil physical properties, *Soil chemical properties, Potassium, Nutrients, Vegetation effects, Leaching, Limestones, Pinyon pine trees, Juniper trees, Ponderosa pine trees.
Identifiers: Moisture gradient.

Forest floor properties along a moisture gradient ranging from dry, represented by a pinyon-juniper stand, to wet, represented by a white fir stand, were studied. Dry weights and amounts of nutrients were directly related to the moisture gradient. Nutrient concentrations were not related to the moisture gradient except for potassium. Sufficent water appears to have been present to allow substantial leaching of potassium from the forest flow in the more mesic stands. Other factors that influence forest floor properties include moisture regime, vegetation types, and parent material. Stand composition is influenced by the moisture gradient as evidenced by the stands at the drier elevations which have open areas that exceed 15 percent. As moisture becomes less of a limiting factor, a greater amount of space may be occupied and utilized. As available moisture increased, there was a tendency for stands to become multilayered. (Mastic-Arizona)
W75-08948

CONTROLLED SUBSURFACE DRAINAGE FOR SOUTHERN COASTAL PLAINS SOIL,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
C. W. Doty, S. T. Currin, and R. E. McLin.
Journal of Soil and Water Conservation, Vol 30, No 2, p 82-84, March-April 1975. 5 fig, 1 tab, 9 ref.

Descriptors: *Water table, *Subsurface drains, *Silage, *Drainage, Rainfall, Soil types, Pervious soils, Soil moisture, Crops, Crop response, Ditches, Hydraulic gradient, Regulation, Costs, Soil profiles, Capillary fringe, Regression analysis, *Southeast US, Coastal Plains.

A field study of water table control through subsurface conduits on a typical Southern Coastal Plains soil showed that in these sandy soils the water table must be kept at 42 inches or less from the soil surface. Silage yields from a field under controlled drainage were greater than those from a nondrained field. For each additional day, between 25 and 55 days, that the water table was less than 42 inches from the soil surface, silage yields increased 0.3 to 0.6 ton per acre. (Visocky-ISWS)
W75-08972

STUDIES ON SOIL INSECTICIDES: XII. EFFECT OF TEMPERATURE AND SOIL MOISTURE ON THE BIOACTIVITY OF SOIL INSECTIDES,
Higher Agricultural Inst., Mushtuhur (Egypt). Dept. of Plant Protection.
A. A. A. Gawaar, A-R. El-Bery, E-S. Abdel-Karim, and F. A. El-Lakwah.
Z Angew Entomol, Vol 75, No 1, p 98-103, 1974.

Descriptors: *Insecticides, *Soil moisture, *Temperature, *Toxicity, Cotton.
Identifiers: Bioactivity, *Lindane, Soil insecticides, Spodoptera-littoralis, *Thimet.

The effects of temperature (26, 30, 35, 40C) and moisture contents (10, 20, 30%) on toxicity of 2.37 ppm of Thimet and lindane were investigated. Thimet had a positive temperature coefficient against prepupae and pupae of the cotton leaf worm Spodoptera littoralis, while lindane showed a negative temperature coefficient. Differences in mortalities due to Thimet at different degrees of temperature were highly significant in contrast to lindane that induced insignificant differences in mortalities as indicated by the analysis of variances. The prepupae were more sensitive to increase in temperature than the pupae. Toxicities of both lindane and Thimet at 20% moisture content were generally higher than at 30% but the differences were not statistically significant.--Copyright 1974, Biological Abstracts, Inc.
W75-08999

ENZYMATIC ACITIVITY OF ERODED SOILS, (IN RUSSIAN),
For primary bibliographic entry see Field 2J.
W75-09105

PREDICTION OF WATER SOLUBLE ARSENIC IN SEWAGE-SOIL SYSTEMS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W75-09127

A SIMPLE SOIL WATER SIMULATION MODEL FOR ASSESSING THE IRRIGATION REQUIREMENTS OF WHEAT,
Israel Meteorological Service, Bet-Dagan.
For primary bibliographic entry see Field 3F.
W75-09152

MAP SHOWING DEPTH TO BEDROCK, PLAINFIELD QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W75-09165

MAP SHOWING DEPTH TO BEDROCK, HEATH QUADRANGLE, MASSACHUSETTS-VERMONT,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W75-09166

CONTOUR MAP OF THE BEDROCK SURFACE, BRISTOL QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-09167

CONTOUR MAP OF THE BEDROCK SURFACE, SOUTHINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-09168

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 1. THE PARALLEL ARRANGEMENT,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-09200

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 2. THE SERIES ARRANGEMENT,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-09201

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 3. THE ELECTRO-KINETIC ENERGY CONVERSION,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-09202

QUANTITATIVE INVESTIGATIONS ON MOISTURE ATTRACTION IN HYGROSCOPIC SALINE SOIL SURFACES IN THE KUCUK MENDERES PLAIN, TURKEY,
W. Andriesse.
Versl Landbouwkd Onderz (Agric Res Rep). 785. 175-179. Illus. 1972.

Descriptors: *Soil moisture, *Saline soils, *Salts, *Soil surfaces, *Chlorides, *Hygroscopic water, Hygrometry, Humidity, Calcium chloride, Magnesium compounds, Plains.
Identifiers: *Turkey(Kucuk Menderes plain).

Saline surfaces with hygroscopic salts (especially MgCl2 and CaCl2) have a moisture content which at night is twice as high as by day, when relative air humidity is lower. In ordinary salt crusts the increase is slight. The hygroscopic surfaces change in color with water content.--Copyright 1974, Biological Abstracts, Inc.
W75-09262

HYGROSCOPIC SURFACES OF SALINE SOILS IN THE KUCUK MENDERES PLAIN, TURKEY: OCCURRENCE, DESCRIPTION AND CHEMICAL ANALYSIS,
W. Andriesse.
Versl Landbouwkd Onderz (Agric Res Rep). 785. 165-174. Illus. 1972.

Descriptors: Saline soils, Hygrometry, Salts, Hygroscopic water, Soil surfaces, Chlorides, Magnesium compounds, Calcium chloride, Chemical analysis.
Identifiers: *Turkey(Kucuk Menderes plain).

Saline soils occur with usually moist and dark surfaces of a puffed nature due to the hygroscopicity of the salts (especially MgCl2 and CaCl2) which are present in higher amounts than in the adjoining dry and pale-colored ordinary salt crusts. Both are rich in NaCl.--Copyright 1974, Biological Abstracts, Inc.
W75-09263

2H. Lakes

CONTRIBUTION TO ECOLOGY OF INDIAN AQUATICS: V. SEASONAL CHANGES IN BIOMASS AND RATE OF PRODUCTION OF 2 PERENNIAL SUBMERGED MACROPHYTES (HYDRILLA VERTICILLATA ROYLE AND

NAIAS GRAMINEA DEL) OF RAMGARH LAKE OF GORAKHPUR (INDIA),
Saint Andrew's Coll., Gorakhpur (India). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-08932

MECHANISMS FOR DEEP WATER RENEWAL IN LAKE NITINAT, A PERMANENTLY ANOXIC FJORD,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W75-08969

AN EMPIRICAL METHOD OF ESTIMATING THE RETENTION OF PHOSPHORUS IN LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-08970

A SUBMERGED HYPOLIMNION AERATOR,
Union Carbide Corp., Tarrytown, N.Y. Aquatic Environmental Sciences.
For primary bibliographic entry see Field 5G.
W75-08971

A TEST OF A SIMPLE NUTRIENT BUDGET MODEL PREDICTING THE PHOSPHORUS CONCENTRATION IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-08986

LIMNOLOGY OF WESTERN SPRINGS, AUCKLAND, NEW ZEALAND,
Kansas Univ., Lawrence. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-09000

PIGMENT CYCLES IN TWO HIGH-ARCTIC CANADIAN LAKES,
For primary bibliographic entry see Field 5C.
W75-09002

EVALUATION OF PRIMARY PRODUCTION PARAMETERS IN LAKE KINNERET (ISRAEL),
For primary bibliographic entry see Field 5C.
W75-09003

BACTERIAL PRODUCTIVITY OF A HIGH MOUNTAIN LAKE,
Innsbruck Univ. (Austria). Inst. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09004

METABOLISM OF THE DOMINANT AUTOTROPHS OF THE NORTH AMERICAN GREAT LAKES,
For primary bibliographic entry see Field 5C.
W75-09005

PRINCIPLES OF TYPOLOGY OF STRATIFIED LAKES IN RELATION TO VERTICAL EXCHANGE,
W. R. Khomskis, and T. N. Filatova.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 528-536, 1972. 3 fig, 2 tab, 8 ref.

Descriptors: *Stratification, *Lakes, Water temperature, Estimating, Estimating equations.
Identifiers: *Lake stratification typology.

Stratification of water in the majority of lakes depends on thermal heterogeneity. When observation data on temperature are available during the summer phase the character of thermal stratification of a lake can be determined by: duration of continuous metalimnion existence; maximum and mean vertical temperature gradient for every phase of the summer period; depth of metalimnion expansion, its upper and lower boundaries during different phases of a summer period; mean velocity of variation for the position of upper and lower boundaries of metalimnion during different phases of summer periods; maximum and mean stability of water mass for every summer phase; coefficient of turbulent heat conductivity; variations of water temperature at bottom layer of hypolimnion during its existence or variations of water temperature at the bottom layer during the annual cycle if the beginning and the end of stagnation are not quite evident. If lake typification is carried out on the basis of these characteristics it is necessary to analyze the data for a deep water area of the lake by means of average observations and take into account extreme values. (Jones-Wisconsin)
W75-09006

THE KINETICS OF EXTRACELLULAR RELEASE OF SOLUBLE ORGANIC MATTER BY PLANKTON,
For primary bibliographic entry see Field 5C.
W75-09007

ESTIMATION OF AQUATIC ECOSYSTEM PARAMETERS,
For primary bibliographic entry see Field 5C.
W75-09008

THE BENTHIC CARBON BUDGET OF A SOUTHERN MICHIGAN MARL LAKE,
For primary bibliographic entry see Field 5C.
W75-09009

THE BIOLOGICAL CYCLE OF MOLYBDENUM IN RELATION TO PRIMARY PRODUCTION AND WATERBLOOM FORMATION IN A EUTROPHIC POND,
For primary bibliographic entry see Field 5C.
W75-09010

ISOTHERMS UNDER ICE,
K. M. Stewart.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 303-311, 1972. 7 fig, 9 ref.

Descriptors: *Isotherms, *Ice cover, *Lakes, *New York, *Wisconsin, Thermal stratification, Density currents, Advection, Convection, Springs, Seepage, Subsurface flow, Heat flow.
Identifiers: McCargo Lake(NY), White Clay Lake(Wis), Lake Wingra(Wis), Tub Lake(Wis), Lime Lake(NY), Conesus Lake(NY).

The thermal stratification and density differences beneath the ice of frozen lakes are usually slight in comparison to those during summer. There is an increase in viscosity in colder water, but the energy requirements for water motion are still less. A variety of frozen lakes in New York and Wisconsin were investigated and checked for water motion as inferred from the distribution of isotherms. Thermal transects were made across the ice of each lake to sampling positions determined by direct measurement or sextant triangulation. Holes were drilled in the ice and temperatures were measured at half-meter depth intervals, or to specific isotherms or fractions thereof. This investigation indicates that the variability and irregularity in isotherm patterns beneath ice are probably greater than heretofore considered. Some apparent thermal instabilities may be countered by chemical contributions arising from reducing conditions in the sediments. Information concerning advection, convection, subsurface springs, heat flux, density currents, and the tracing of effluents can be inferred from the slope and distribution of isotherms in frozen lakes. Isotherms may be essentially horizontal at all levels in some lakes and surprisingly irregular and difficult to interpret in others. (Jones-Wisconsin)
W75-09011

THE RADIATION BALANCE OF LAKES ON THE TERRITORY OF THE USSR,
For primary bibliographic entry see Field 5C.
W75-09012

HYDROLOGICAL FEATURES OF LAKE ONEGA IN THE ANNUAL CYCLE,
For primary bibliographic entry see Field 5C.
W75-09013

SEASONAL CHANGES IN DISSOLVED ORGANIC NITROGEN IN SIX MICHIGAN LAKES,
For primary bibliographic entry see Field 5C.
W75-09014

BIOLOGICAL ASPECTS ON THE LARGE LAKES IN SOUTH SWEDEN,
For primary bibliographic entry see Field 5C.
W75-09015

A COMPARISON OF SEDIMENT OXYGEN UPTAKE, HYPOLIMNETIC OXYGEN DEFICIT AND PRIMARY PRODUCTION IN LAKE ESROM, DENMARK,
For primary bibliographic entry see Field 5C.
W75-09017

PHYTOPLANKTONIC PRIMARY PRODUCTION DURING THE SUMMER STAGNATION IN THE EUTROPHICATED LAKES LOVOJARVI AND ORMAJARVI, SOUTHERN FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-09018

ALGAE IN ALKALINE WATERS OF KANEM (TCHAD): I, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
For primary bibliographic entry see Field 5C.
W75-09020

SIMULATION OF URBAN RUNOFF, NUTRIENT LOADING, AND BIOTIC RESPONSE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5C.
W75-09022

THE PHOSPHORUS BUDGET OF CAMERON LAKE, ONTARIO: THE IMPORTANCE OF FLUSHING RATE TO THE DEGREE OF EUTROPHY OF LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09023

SOME RELATIONSHIPS BETWEEN ALGAL STANDING CROP, WATER CHEMISTRY, AND SEDIMENT CHEMISTRY IN THE ENGLISH LAKES,
Minnesota Univ., Minneapolis. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-09024

DISTRIBUTION OF BENTHIC INVERTEBRATES IN THE SOUTH END OF LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.

W75-09025

CHEMICAL AND HYDROLOGICAL CHARACTERISTICS OF THE WISCONSIN-LAKE SUPERIOR DRAINAGE BASIN: EASTERN SECTOR,
Northland Coll., Ashland, Wis.
For primary bibliographic entry see Field 5C.
W75-09026

POSSIBLE ACCELERATED EUTROPHICATION THRESHOLDS IN THE GREAT LAKES RELATIVE TO HUMAN POPULATION DENSITY,
State Univ. Coll., Brockport, N.Y. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-09027

CHANGES IN ZOOPLANKTON POPULATIONS IN LAKE ONTARIO (1939-1972),
State Univ. of New York, Albany. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-09028

THE INFLUENCE OF WATER RENEWAL ON THE NUTRIENT SUPPLY IN SMALL, OLIGOTROPHIC (NEWFOUNDLAND) AND HIGHLY EUTROPHIC (ALBERTA) LAKES,
Canadian Wildlife Service, Halifax (Nova Scotia).
For primary bibliographic entry see Field 5C.
W75-09029

EUTROPHIC LAKES IN THE MACKENZIE DELTA: THEIR USE BY WATERFOWL,
Alberta Univ., Edmonton. Dept. of Geography.
For primary bibliographic entry see Field 5C.
W75-09031

CHANGES IN WATER CHEMISTRY ACCOMPANYING SUMMER FISH KILLS IN SHALLOW EUTROPHIC LAKES OF SOUTHWEST MANITOBA,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W75-09032

EUTROPHICATION AND RECREATIONAL FISHES IN TWO LARGE LAKE BASINS IN BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
For primary bibliographic entry see Field 5C.
W75-09033

ENGINEERING ASPECTS OF POLLUTED LKE RECLAMATION,
Notre Dame Univ., Indiana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-09034

RELATIONS BETWEEN MICROBIAL HETEROTROPHIC ACTIVITY, ORGANICS, AND DEOXYRIBONUCLEIC ACID IN OLIGOTHROPHIC LAKE SEDIMENTS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
For primary bibliographic entry see Field 5C.
W75-09035

EFFECTS OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON LAKE WABAMUN, ALBERTA, CANADA: THE EPIPELIC AND EPIPSAMMIC ALGAL COMMUNITIES,
Alberta Univ., Edmonton. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-09036

SPATIAL AND TEMPORAL DISTRIBUTION OF CHLORPHYLL, AND PHEOPIGMENTS IN SURFACE WATERS OF LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-09039

THE EFFECT OF CITRATE ON PHYTOPLANKTON IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-09040

ORGANIC PRODUCTION STUDIES IN HIGH ALTITUDE LAKES OF INDIA: II. ZOOPLANKTON, PHYTOPLANKTON AND PEDON OF HIGH ALTITUDE KASHMIR LAKES, KOUNSARNAG AND ALPATHER, WITH CORRELATION OF PLANKTONVOLUME, PH AND TEMPERATURE OF DAL LAKE,
Kashmir Univ., Srinagar (India). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09041

ABUNDANCE AND PRODUCTION OF BACTERIA IN LATVIAN LAKES,
For primary bibliographic entry see Field 5C.
W75-09042

DYNAMICS AND PRODUCTION OF SIMOCEPHALUS SERRULATUS (KOCH) IN TWO LARGE NATURAL AND MAN-MADE PONDS IN EASTERN CANADA,
For primary bibliographic entry see Field 5C.
W75-09044

A DIURNAL ZOOPLANKTON MIGRATION STUDY IN LAKE MEAD,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 5C.
W75-09059

THE EFFECTS OF DIURON ON BACTERIAL POPULATIONS IN AQUATIC ENVIRONMENTS,
Clemson Univ., S.C. Dept. of Microbiology; and Clemson Univ., S.C. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09079

PHYTOPLANKTON DISTRIBUTION AND WATER QUALITY INDICES FOR LAKE MEAD (COLORADO RIVER),
Arizona Univ., Tucson. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-09083

THE INFLUENCE OF LATE CENOZOIC STRATIGRAPHY ON DISTRIBUTION OF IMPOUNDMENT-RELATED SEISMICITY AT LAKE MEAD, NEVADA-ARIZONA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W75-09192

THE LAKE DILEMMA,
For primary bibliographic entry see Field 6E.
W75-09265

PRELIMINARY REPORT ON WIND ERRORS ENCOUNTERED DURING AUTOMATIC PROCESSING OF IFYGL LORAN-C DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 7A.
W75-09270

IFYGL PHYSICAL DATA COLLECTION SYSTEM: INTERCOMPARISON DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 7C.
W75-09271

EFFECTS OF ICE COVER ON DISSOLVED OXYGEN IN SILVER LAKE, ONTARIO,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 2C.
W75-09291

PLANKTON, CHEMISTRY, AND PHYSICS OF LAKES IN THE CHURCHILL FALLS REGION OF LABRADOR,
Waterloo Univ. (Ontario). Dept. of Biology.
H. C. Duthie, and M. L. Ostrofsky.
J Fish Res Board Can, Vol 31, No 6, p 1105-1117, 1974. Illus.

Descriptors: *Canada, *Lakes, Plankton, Reservoirs, *Diatoms, Phytoplankton, Eutrophication, Water chemistry.
Identifiers: Asterionella-formosa, Bosmina-coregoni, Churchill Falls, Cyclops-scutifer, Daphnia-galeata-mendotae, Daphnia-longiremis, Diaptomus-minutus, Dinobryon, Holopedium-gibberum, Labrador, Rhizosolenia-eriensis, Tabellaria-fenestrats, Michikaman Lake, Ossokmanuan Reservoir.

Of 10 lakes and a reservoir in the Churchill Falls region of western Labrador (Canada) studied in 1970-71, 9 lakes were 12 m or less deep, humic, thermally unstratified and had Secchi disc transparencies between 3.5 and 8.25 m. Maximum surface temperatures of 16-17 C in the 9 lakes were generally reached by mid-Aug. Michikamau Lake (area 1980 km2, depth 84 m) rarely exceeded 12 C and had a Secchi disc transparency of 13 m. Conductivities and alkalinities (as CaCO3) ranged from about 13 micro-mho/cm and less than 6.5 mg/1, for lakes draining granite, gneiss, or quartz bedrock, to about 30 and 15, for those draining gabbro or slate. Maximum live phytoplankton biomasses in 1970 ranged 70 mg/m3, in Michikamau Lake, to 739 mg/m3, in Ossokmanuan Reservoir, and, in general, there was a positive correlation with conductivity. Diatoms were the most abundant group, in particular Asterionella formosa, Tabellaria fenestrata and Rhizosolenia eriensis; however, flagellated Chysophta, mainly species of Dinobryon, were more abundant in the reservoir than in the natural lakes. Predominant zooplankters included Diaptomus minutus, Cyclops scutifer, Holopedium gibberum, Daphnia longiremis, D. galeata mendotae and Bosmina coregoni. Maximum seasonal standing crops ranged from 1600 to 8910 individuals/m3, with the highest densities being found in the reservoir. The reservoir, 8 yr after filling, showed little evidence of trophic upsurge and was possibly entering a period of trophic depression.--Copyright 1974, Biological Abstracts, Inc.
W75-09317

2I. Water In Plants

ON THE DIRUNAL VARIATION OF LEAF WATER CONTENT ON AN AREA BASIS IN THE RICE PLANT, IN JAPANESE,
Tokyo Uniur of Agriculture and Technology (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 3F.
W75-08904

A STUDY TO EXPLORE THE USE OF ORBITAL REMOTE SENSING TO DETERMINE NATIVE ARID PLANT DISTRIBUTION,
Arizona Univ., Tuson. Office of Arid-Lands Studies.
For primary bibliographic entry see Field 7B.
W75-08945

CHARACTERIZATION OF THE FOREST FLOOR IN STANDS ALONG A MOISTURE GRADIENT IN SOUTHERN NEW MEXICO,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W75-08948

EFFECTS OF ROOT MEDIUM AND WATERING ON TRANSPIRATION, GROWTH AND DEVELOPMENT OF GLASSHOUSE CROPS; I. EFFECTS OF COMPRESSION AT VARYING WATER LEVELS ON PHYSICAL STATE OF ROOT MEDIA AND A TRANSPIRATION AND GROWTH OF TOMATOES,
State Experiment Station Landvik, Grimstad (Norway).
For primary bibliographic entry see Field 2D.
W75-09162

EFFECT OF FERTILIZER APPLICATION ON REGENERATION OF NATURAL GRASSLANDS IN COASTAL PARTS OF MAHARASHTRA,
College of Agriculture, Poona (India). Botany Section.
J. K. Oke.
Indian J Agric Sci, 42(10): 897-900. Illus. 1972.

Descriptors: *Nitrogen, *Phosphorus, *Fertilizers, *Grasses, Grasslands, Soil treatment, Coasts, Rainfall.
Identifiers: Eulalea-argentea, *India(Maharashtra), Ischaemum-aristatum, Iseilema-wightii, Themeda-cymbaria.

Graded doses of N and P fertilizers were applied to natural grasslands at Palghar and Vangaon located in the coastal district of northern Thana in the high-rainfall zone of Maharashtra (India), from 1962-63 to 1965-66. The predominant grass at Palghar is Ischaemum aristatum with Iseilema wightii as a subdominant grass. At Vangaon Ischaemum aristatum, Iseilema wightii, Themeda cymbaria and Eulalea argentea occur. The soils differed at these locations. At both places fertilizer application resulted in significant changes in yield and botanical composition. Considering both these aspects 40 kgN + 20 kg P/ha was the most suitable dose for both locations.--Copyright 1974, Biological Abstracts, Inc.
W75-09231

EFFECTS OF DIETARY CALCIUM AND PHOSPHORUS ON GROWTH, FOOD CONVERSION, BONE ASH AND HEMATOCRIT LEVELS OF CATFISH,
Georgia Univ., Savannah. Agricultural Experiment Station.
J. W. Andrews, T. Murai, and C. Campbell.
J Nutr, Vol 103, No 5, p 766-771, 1973.

Descriptors: Fish, *Catfishes, Freshwater fish, *Growth rates, *Fish diets, Fish physiology, *Calcium, *Phosphorus.
Identifiers: Bone ash, Hematocrit levels, Ictalurus-punctatus.

Channel catfish (Ictalurus punctatus) fingerlings were fed diets containing varying dietary levels and ratios of Ca (0.5-2.0%) and P (0.5-1.2%). Results from 2 studies indicated that the available P requirement of catfish is approximately 0.8% of diet. In both experiments gains were maximal in fish fed diets containing 1.5% Ca and were reduced when higher levels were fed. This hypercalcemia effect could not be prevented by adjusting the Ca/P ratio by the addition of P to the diet. A P deficiency characterized by reduced growth, poorer food efficiency and lower bone ash and hematocrit levels occurred in fish fed 0.5 or 0.6% available P. The absence of a growth response to 0.4% supplemented P in the form of calcium phytate suggested that catfish are not able to fully utilize phytin P. Bone ash values from skull and vertebrae samples indicated that the Ca requirement for maximal bone mineralization may be higher than that for optimal growth.--Copyright 1973, Biological Abstracts, Inc.
W75-09299

PATTERNS OF SOIL MOISTURE DEPLETION IN A MIXED OAK STAND,
Rhode Island Univ., Kingston.
J. H. Brown, Jr., and T. G. Bourn.
For Sci, Vol 19, No 1, p 23-30, 1973. Illus.
Identifiers: *Moisture depletion, Neutron, *Oak, Patterns, *Quercus-alba, *Quercus-coccinea, *Soil moisture, Stemflow, Throughfall.

Soil moisture regimes were studied under 5 white oak trees (Quercus alba L.) and 5 scarlet oak trees (Q. coccinea Muench.) in a mixed-oak stand. Locations under canopies (near trunk, mid-crown and crown-edge) were monitored with a neutron probe. Soil water losses for each location were calculated for the 1968 growing season, taking into consideration inputs of throughfall and stemflow. Although overall patterns of depletion and accretion were similar between species, significant differences in depletion existed at the 2.0 and 2.5 ft depths near tree trunks. Soil moisture depletion near tree trunks was greater under scarlet oaks than under white oaks. Similarly, seasonal water losses for locations near tree trunks were greater for scarlet oaks; losses averaged 24.2 in. for scarlet oaks and 18.4 in. for white oaks. This difference was due to a greater amount of estimated stemflow reaching soil under scarlet oaks.--Copyright 1973, Biological Abstracts, Inc.
W75-09320

ECOLOGY OF INDIAN DESERT: VIII. ON THE WATER RELATIONS AND ASSIMILATE BALANCE OF SOME DESERT PLANTS,
Jodhpur Univ. (India). Dept. of Botany.
For primary bibliographic entry see Field 3B.
W75-09322

STUDIES ON THE BIOLOGY OF DANISH STREAM FISHES: III. ON SEASONAL FLUCTUATIONS IN THE STOCK DENSITY OF YELLOW EEL IN SHALLOW STREAM BIOTOPES, AND THEIR CAUSES,
Danmarks Fiskeri- og Havundersogelser, Charlottenlund.
K. Larsen.
Medd Dan Fisk Havunders, Vol 7, No 2, p 23-46, 1972. Illus.

Descriptors: *Eels, Europe, Fish, Marine fish, Lampreys, Populations, *Fish populations, Shallow water, *Temperature, *Vegetation effects.
Identifiers: *Denmark, Lellinge stream, Ejby stream, Yellow eel.

Stock analyses were bade over a 4-yr period on eels in the shallow biotopes of the Lellinge and the Ejby streams. The density of eels fluctuates greatly and in a distinctly seasonal rhythm. In accordance with the marked direct relation between the fluctuations in the stock density of eel on one hand and the changes in the water temperature on the other, the conclusion can be drawn that the stock fluctuations are directly temperature-conditioned. High water temperatures cause a high density of eels, while at low water temperatures the density is low, and the extreme cases there is even a total absence of eels. The consequence is, therefore, a high density of eels in summer, and a low density in winter. On biotopes as those selected for the present investigation, where various kinds of shelters for eels are found, the overgrowing of the stream by water plants has no or at least no apparent-influence on the stock density, while the opposite may be assumed to be the case in streams, where eels can only hide in the vegetation, and where consequently the percentage vegetation cover may be a decisive factor as to how many eels can actually hide there. The majority of the yellow eels in the shallow localities of a stream is of a size which is below the prescribed minimum legal size, i.e., 35 cm. Those biotopes are therefore important growth localities and only to a very limited extent catch localities.--Copyright 1974, Biological Abstracts, Inc.
W75-09328

PROCEEDINGS TALL TIMBERS CONFERENCE ON ECOLOGICAL ANIMAL CONTROL BY HABITAT MANAGEMENT, NO. 4.
Tall Timbers Research Station, Tallahassee, Fal. Tallahassee, Fla, Feb 24-25, 1972, 244 p. Tall Timbers Research Station: Tallahassee, Fla, 1973.

Descriptors: *Animal control, Habitats, Wildlife habitats, *Conferences, Insects, Biocontrol, Insect populations, Hosts, Parasites, Water hyacinth, Nematodes, Plant breeding, *Pest control, *Insect control, *Predation, *Management.
Identifiers: Argentina, Labauchena-daguerrei, Neodiprion, Solenopsis, Trichogramma, Biometeorology, Ants, Flies, Mites, Pests, Symposiums.

This volume contains the contributed papers presented at the symposium covering a variety of aspects involving animal control by habitat management. The content begins with a paper on interfield and interplant spacing in tropical insect control, followed by a discussion on private enterprise pest management based on biological control. The next several papers cover the following specific topics: the application of biometeorology for determining the microenvironment of insect populations; influence of host-origin feeding inhibitors on Neodiprion (sawfly) feeding behavior; animals associated with the Solenopsis (fire ants) complex, with special reference to Labauchena daguerrei; and potential for water hyacinth management based on studies in Argentina. A group of papers is then included covering the following specific topics: managing nematodes by plant breeding; management of nematode populations in Great Britain; management of plant-parasitic nematode populations; and utilization of parasites and predators in nematode pest management ecology. A group of papers follows on the following specific topics: nematode parasites of insects; the use of Trichogramma in the USSR; integrated control of insect pests of cotton; and management of insect pests of soybeans. Finally, a paper is included on agroecological factors influencing the biology and management of predaceous mites, followed by a paper on the International Biological Program work on the strategies and tactics of pest management. Numerous tables, diagrams and photographs are included throughout, and each paper ends with a list of literature cited.--Copyright 1973, Biological Abstracts, Inc.
W75-09333

2J. Erosion and Sedimentation

ENVIRONMENTAL ASPECTS--SACRAMENTO BANK PROTECTION,
Hydrologic Engineering Center, Davis, Calif. Water Resources Planning Branch.
For primary bibliographic entry see Field 4D.
W75-08981

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
D. E. Nelson, and J. P. Coakley.
Scientific Series No. 32, 1974. 2 fig, 3 tab, 61 ref.

Descriptors: *Analytical techniques, *Tracking techniques, *Sediment transport, *Tracers, Movement, Clays, Silts, Sands, Coarse sediments, Data collections, Raioactive tracers, Fluorescent dye, Tagging, Neutron activation analysis, X-ray fluorescence, Synoptic analysis, Radioactivity techniques, Fluorometry, Sedimentation, Bed load.
Identifiers: *Mass transport, Thermoluminescence, Radio-photoluminescence.

Methods using artificial tracers to quantitatively determine sediment movement are described and the principles of tagging sediment, injection, detection, and interpretation of data are discussed. Radioactive tracing is probably the most effective for synoptic or near-synoptic surveys of large, rapidly evolving systems, but involves some hazards. Fluorescent tracers are non-hazardous, inexpensive, and simple to inject. Several tracers can be used simultaneously, but quantitative detection is difficult on quickly evolving systems. Their long life makes repeated studies difficult and may cause unfavorable public reaction; this technique is most useful on slowly-evolving systems. Neutron activation, x-ray fluorescence, atomic absorption, and atomic emission tracing methods require unit sampling, but offer some advantages over fluorescent tracers. Thermoluminescence and radio-photoluminescence can be used to mark clays, silts, and sands inexpensively. Labelled sediment is harmless and indistinguishable from unmarked material except when heated. Sediment could be mass labelled in situ, have several different tags, and be measured over a period of time. This method requires unit sampling. The best tracing techniques for sediments containing various particle sizes are discussed. The Oak Ridge National Laboratory radioisotope sand tracing system (RIST) and a simplified data acquisition device for sediment transport studies are described. A bibliography containing 349 references is appended. (Buchanan-Davidson--Wisconsin)
W75-08995

A COMPARISON OF SEDIMENT OXYGEN UPTAKE, HYPOLIMNETIC OXYGEN DEFICIT AND PRIMARY PRODUCTION IN LAKE ESROM, DENMARK,
For primary bibliographic entry see Field 5C.
W75-09017

SOME RELATIONSHIPS BETWEEN ALGAL STANDING CROP, WATER CHEMISTRY, AND SEDIMENT CHEMISTRY IN THE ENGLISH LAKES,
Minnesota Univ., Minneapolis. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-09024

RELATIONS BETWEEN MICROBIAL HETEROTROPHIC ACTIVITY, ORGANICS, AND DEOXYRIBONUCLEIC ACID IN OLIGOTHROPHIC LAKE SEDIMENTS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
For primary bibliographic entry see Field 5C.
W75-09035

ENZYMATIC ACTIVITY OF ERODED SOILS, (IN RUSSIAN),
B. N. Simonyan, and A. S. Galstyan.
Biol Zh Arm, Vol 27, No 4, p 60-67, 1974.

Descriptors: *Enzymes, Erosion, *Erosion rates, Soils, *Soil erosion, Chenozems, Brown soils, Chestnut soils, Deserts, *Biological communities.
Identifiers: Catalase, Dehydrogenase, *Invertase, Phosphatase, Urease, Armenia, USSR, Semidesert regions, Meadowland, Steppes, *Enzymatic activity.

The activity of enzymes (invertase, phosphatase, urease, catalase and dehydrogenases) was studied according to the degree of erosion of chernozems, mountain-meadow, brown forest-steppe, chestnut and brown semidesert soils of the Armenian SSR. The method of enzymatic reactions made it possible to characterize the biological activity of the eroded soils and to reveal features of the soil erosion processes. Eroded soils had a lower biological activity than the uneroded ones. The most suitable enzyme for diagnosis is of eroded soils was invertase.--Copyright 1975, Biological Abstracts, Inc.
W75-09105

WATER RESOURCES DATA FOR KANSAS, 1974: PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 7C.
W75-09181

PROGRESS IN WATERSHED DEVELOPMENT IN THE AWR BASINS AREA UNDER USDA PROGRAMS - SEPTEMBER 1974.
Soil Conservation Service, Wichita, Kans.
For primary bibliographic entry see Field 4D.
W75-09246

A CONCEPTUAL MODEL OF OFFSHORE PERMAFROST,
Alaska Univ., College. Geophysical Inst.
T. E. Osterkamp.
Geophysical Institute Report No. UAG R-234, Sea Grant Report No. 75-3, April 1975. 23 p, 8 fig, 12 ref. OSG 40-3-158-41.

Descriptors: *Model studies, *Permafrost, *Coasts, *Erosion, Climatology, Thermodynamics, Oceanography, *Alaska.
Identifiers: *Conceptual models, *Offshore permafrost, Coastal erosion, Thermal boundary conditions, Chemical boundary conditions, Transport equations, Vertical soil profiles.

The coastal erosion process has been examined for the northern Alaskan coast for the purpose of developing a conceptual model of offshore permafrost. A series of as many as five stages of coastal erosion, characterized by different thermal and chemical boundary conditions, is necessary to describe the physical setting of the offshore permafrost. The seasonal variations of thermal and chemical boundary conditions are discussed, and incorporation of these varying boundary conditions into a model of offshore permafrost, consisting of the generalized transport equations from non-equilibrium thermodynamics, is suggested. This can be accomplished by successive application of the transport equations to the five stages experienced by a vertical soil profile during the erosion process. (NOAA)
W75-09266

ENVIRONMENTAL STUDY OF THE MARINE ENVIRONMENT NEAR NOME, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W75-09275

BELWOOD RESERVOIR, 1971 SEDIMENTATION STUDY.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Ontario Ministry of Natural Resources, Toronto. Conservation Authorities Branch.
29 p, 1975, Inland Waters Directorate, Environment Canada, Ottawa, Canada, 48 fig, 6 append.

Descriptors: *Sedimentation, *Sedimentation rates, *Reservoirs, Deposition(Sediments), Beds, Bank erosion, Data collections, Analytical techniques.
Identifiers: *Grand River, Reservoir lifetime, Sectional sedimentation rates, Belwood Reservoir.

A 1971 Sediment Survey of the Belwood Reservoir is described. This was the first of a series of at least three surveys which are to be conducted at this reservoir. Thirty-three cross-sections were established within the reservoir and their profiles were surveyed. Sampling of bed material and suspended sediment was also carried out. The results are illustrated by tables and graphs in the Appendixes. Recommendations include a plan for subsequent surveys of the reservoir and an outline of methods to be utilized for determining densities of the deposited sediment. The computed density patterns and volumetric assumulation rates will form the basis for estimating sedimentation rates within all sections of the reservoir. This information should help pinpoint future problem areas thereby enabling preventive measures to be taken in some cases. Additionally the above sectional sedimentation rates will determine the overall reservoir sedimentation rate and therefore anticipated reservoir lifetime. (Env. Canada)
W75-09286

AN ANALYSIS OF THE DYNAMICS OF DDT IN MARINE SEDIMENTS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 5B.
W75-09300

2K. Chemical Processes

SHORT-TERM VARIATIONS IN ESTIMATES OF CHLOROPHYLL ABUNDANCE,
National Marine Fisheries Service, Woods Hole, Mass. Northeast Fisheries Center.
J. B. Colton.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-73-10850, $3.25 in paper copy, $2.25 in microfiche. International Commission for the Northwest Atlantic Fisheries Research Bulletin No 9, p 81-84, 1972. 2 fig, 16 ref. (Report No NOAA-73050414).

Descriptors: *Chlorophyll, *Fluctuations, *Continental Shelf, Canada, New York, Water temperature, Tidal effects, Internal waves, Sampling, Depth, Thermocline.
Identifiers: Nova Scotia(Canada), Long Island(NY).

Quarterly surveys were made of Continental Shelf waters between Nova Scotia and Long Island. Changes in chlorophyll abundance observed within a given water mass during June 1966 are illustrated and the variation examined in relation to hydrographic conditions and sampling techniques. Chlorophyll was determined by fluorescence of sea water extracts. Although tidal forces undoubtedly were instrumental in generating interal waves, turbulent forces due to winds and bottom topography tended to mask the semidiurnal periodicity in the vertical oscillations. Hourly bathythermograph observations revealed the presence of internal waves of a shorter period than indicated by the 2-hr sampling interval. Average 'chlorophyll depth' (determined by multiplying concentration of chlorophyll by depth sampled, summing the weighted samples, and dividing by

the total chlorophyll at all depths) tended to oscillate as did the thermocline, but to a lesser degree. Average chlorphyll depth for all stations was 30 m and maximum vertical displacement during a 2-hr period was 9 m. The vertical displacement of depth of maximum chlorophyll concentration was reflected in range of chlorophyll values observed at specific depths. These ranges were greatest between 20 and 40 m. (Jones-Wisconsin)
W75-08992

SOLUBILITY EQUILIBRIUM CONSTANT OF ALPHA-HOPEITE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-09037

THERMODYNAMICS OF SYSTEM H20-NA2HPO4-(NH4)2HPO4 AT 25(DEGREES)C,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-09038

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND NATURAL WATERS, (PHASE II OF) A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 5A.
W75-09125

PORTABLE DEVICE FOR THE QUANTITATIVE DETERMINATION OF TRACE ELEMENTS IN WATER IN THE SUB-NANO GRAM SENSITIVITY RANGE,
Missouri Univ., St. Louis. Dept. of Physics.
For primary bibliographic entry see Field 5A.
W75-09126

PREDICTION OF WATER SOLUBLE ARSENIC IN SEWAGE-SOIL SYSTEMS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W75-09127

HYDRO-GEOCHEMISTRY IN A CARBONATE BASIN - GEOMORPHIC AND ENVIRONMENTAL IMPLICATION,
Vanderbilt Univ., Nashville, Tenn. Dept. of Geology.
A. L. Reesman, A. W. Walton, C. L. Sprinkle, A. E. Godfrey, and D. B. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 121 $8.50 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Res Rept No 44, April 23, 1975. 261 p, 46 ref, 2 append. OWRT B-018-TENN(3). 14-01-0001-3650.

Descriptors: *Geochemistry, Weathering, *Carbonates, *Geomorphology, *Phosphates, Nitrates, Sulfates, Silica, Runoff, *Tennessee, Environmental effects, Erosion, Dissolved solids, Hydrographs, Water chemistry, Chert, Aluminum, Diagenesis, Pollutant identification.
Identifiers: Cartwright Basin(Tenn), Williamson County(Tenn).

Physical erosion at Cartwright Basin is proceeding at rates of 5 to 10 times the steady state value. During farming enhancement was greater. Denudation of pre-Fort Payne rocks averages 170 ft/ my (Feet per million years) with the siliceous Ft. Payne Formation at 1/3.35 (51 ft/my) this rate. Differential relief in Cartwright and the Central Basin results from erosion of slow-fast-slow 'sandwich' stratigraphic units. Phosphate at 1 ppm is released rapidly from natural sources and nitrate at 3 ppm comes mainly from soil leaching. Icicle analyses from specific stratigraphic intervals helped pinpoint sources of dissolved constituents as did solutions equilibrated with soil and rock samples. Analyses of stream hydrographs suggest four flow components: overland, 'interflow', rapid-groundwater system, and long-term, low-flow system. Estimated flow percentages of each on a long-term basis are 30%, 11%, 51%, and 8% respectively. Water chemistry of each component appears to be distinctive. Effective porosity of rocks appears to be very low (.05%). Chert dominates the soil mineralogy with particle sizes ranging from a micron to centimeters and may be dense to very porous. Properties of cherty residuum from the Fort Payne and other formations are important in determining soil properties and stability. Aluminum may be a key to the diagenetic redistribution of silica in silica rich sediments.
W75-09129

DISCHARGE MEASUREMENTS AND CHEMICAL ANALYSES OF WATER IN NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 7C.
W75-09172

SALT-BALANCE STUDY OF PAUBA VALLEY, UPPER SANTA MARGARITA RIVER AREA, RIVERSIDE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-09177

WATER RESOURCES DATA FOR KANSAS, 1974: PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 7C.
W75-09181

PROBLEMS IN C-14 DATING OF WATER FROM AQUIFERS OF DELTAIC ORIGIN--AN EXAMPLE FROM THE NEW JERSEY COASTAL PLAIN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-09183

GROUND-WATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 6D.
W75-09185

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE TEHAMA-COLUSA CANAL SERVICE AREA, SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-09187

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 1. THE PARALLEL ARRANGEMENT,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
R. C. Srivastava, and A. K. Jain.
Journal of Hydrology, Vol 25, No 3/4, p 307-324, May 1975. 9 fig, 4 tab, 11 ref.

Descriptors: *Membranes, *Electro-osmosis, *Clays, *Thermodynamics, Kaolinite, Bentonite, Electric currents, Zeta potential, Permeability, Model studies, Pressure, Flow, Isotropy, Hydraulic conductivity.
Identifiers: Irreversible processes, Streaming potential, Streaming current, Water flux, Parallel arrangements, Mass flux, Phenomenological coefficients.

Electro-osmosis of water through composite clay membranes consisting of kaolinite and bentonite in parallel arrangement was studied, and the form of the phenomenological relations for the simultaneous transport of water and electricity was derived. The phenomenological relation for the electrical flux was found to be the usual linear and homogeneous equation, while the relationship between the water flux and the thermodynamic forces was found to be represented by a nonlinear exponential type of relationship. Relationships among the phenomenological coefficients characterizing the parallel arrangement as a whole and its constituent membrane elements were investigated. The combination rules given by Kedem and Katchalsky were found to be valid for the phenomenological coefficients representing the streaming current and ordinary electrical conductivity but not in the case of the other two coefficients representing the hydraulic conductivity and the electro-osmotic velocity, for which modifications in the combination rules were suggested. Study of directional characteristics of the phenomenological coefficients revealed the isotropic character of the composite parallel clay membrane. (See also W75-09201 and W75-09202) (Visocky-ISWS)
W75-09200

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 2. THE SERIES ARRANGEMENT,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
R. C. Srivastava, and A. K. Jain.
Journal of Hydrology, Vol 25, No 3/4, p 325-337, May 1975. 5 fig, 5 tab, 4 ref.

Descriptors: *Membranes, *Electro-osmosis, *Clays, *Thermodynamics, Kaolinite, Bentonite, Electric currents, Zeta potential, Permeability, Model studies, Pressure, Flow, Anisotropy.
Identifiers: *Irreversible processes, *Streaming potential, *Streaming currents, Water flux, Series, Mass flux, Phenomenological coefficients.

The electro-osmosis of water through a composite clay membrane consisting of kaolinite and bentonite clay-membrane elements in a series array was studied and the form of the phenomenological relations ascertained. The electrical flux in the presence of both pressure difference and electrical-potential difference was found to be represented by the usual linear equation. The phenomenological relation for the water flux, though linear, was different from the usual one, because the graphs between water flux and pressure difference, and electro-osmotic velocity and applied electrical-potential difference were found to be straight lines having definite intercepts on the x-axis. The combination rules for membranes in series were found to be valid only for the phenomenological coefficients representing the hydraulic permeability and not in the case of the other three coefficients representing the electro-osmotic velocity, streaming current, and electrical conductivity. The study of directional characteristics of the phenomenological coefficients revealed the anisotropic character of the composite clay membrane in a series arrangement. (See also W75-09200 and W75-09202) (Visocky-ISWS)
W75-09201

NON-EQUILIBRIUM THERMODYNAMICS OF ELECTRO-OSMOSIS OF WATER THROUGH COMPOSITE CLAY MEMBRANES, 3. THE ELECTRO-KINETIC ENERGY CONVERSION,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
R. C. Srivastava, and A. K. Jain.
Journal of Hydrology, Vol 25, No 3/4, p 339-351, May 1975. 8 fig, 2 tab, 9 ref.

Descriptors: *Thermodynamics, *Electro-osmosis, *Membranes, *Kinetics, Clays, Kaolinite, Efficiencies, Zeta potential, Energy transfer, Membrane processes, Pressure head, Flow, Equations.
Identifiers: *Nonequilibrium conditions, Streaming potential, Composite membranes, Parallel membranes, Series membranes.

The efficiencies of electro-kinetic energy conversion in the cases of kaolinite, bentonite, and composite clay membranes, consisting of kaolinite and bentonite membrane elements in a parallel array and in a series array, were calculated. The conversion efficiencies in the case of composite clay membrane systems were found to be linearly related to the conversion efficiencies of the constituent membrane elements. This result was experimentally supported in the case of the parallel membranes. The maximum values of the conversion efficiency for both modes of conversion, i.e., electro-osmotic flow and streaming potential were found to be equal to each other and also independent of the applied input forces. However, the efficiency of energy conversion was found to be dependent on the direction of the input force in the case of a series clay membrane system. The optimum values predicted by the respective figures of merit agree with those experimentally found. Conversion efficiency would be maximum if the output force equals half of the value of the electro-osmotic pressure. (See also W75-09200 and W75-09201) (Visocky-ISWS)
W75-09202

CHANGE IN POTENTIAL OF REFERENCE FLUORIDE ELECTRODE WITHOUT LIQUID JUNCTION IN MIXED SOLVENTS,
Missouri Univ., Columbia. Dept. of Chemistry.
K. M. Stelting, and S. E. Manahan.
Analytical Chemistry, Vol 46, No 4, p 592-594, April 1974. 3 fig. OWRR A-049-MO(6). 14-31-0001-3525.

Descriptors: Potentiometers, Fluorides, Analysis, Electrodes, Instrumentation.
Identifiers: Liquid junction potentials, Acetonitrile, Silver, Organic solvents, Complexation, Potentiometry.

A major problem with potentiometric measurements is liquid junction potentials at the reference electrode. To eliminate this effect the fluoride electrode was used as a reference in a cell without liquid junction. It was a less suitable reference than the calomel electrode for complexation studies in systems where addition of an organic ligand appreciably alters the properties of the solvent. The relatively large negative shift in potential of the fluoride reference electrode in going from an aqueous medium 0.100 M in acetonitrile to a similar medium 4.0 M in acetonitrile can be explained entirely upon the basis of decreased solubility of the lanthanum fluoride electrode membrane in the partially organic medium.
W75-09239

QUANTITATIVE INVESTIGATIONS ON MOISTURE ATTRACTION IN HYGROSCOPIC SALINE SOIL SURFACES IN THE KUCUK MENDERES PLAIN, TURKEY,
For primary bibliographic entry see Field 2G.
W75-09262

HYGROSCOPIC SURFACES OF SALINE SOILS IN THE KUCUK MENDERES PLAIN, TURKEY: OCCURRENCE, DESCRIPTION AND CHEMICAL ANALYSIS,
For primary bibliographic entry see Field 2G.
W75-09263

2L. Estuaries

SOME FACTORS AFFECTING THE SURVIVAL OF COLIFORM BACTERIA IN SEAWATER (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science Technology.
For primary bibliographic entry see Field 5C.
W75-08884

SALINITY-TEMPERATURE PROFILES IN THE PANAMA CANAL LOCKS,
Smithsonian Institution, Washington, D.C. Dept. of Invertebrate Zoology.
M. L. Jones, and C. E. Dawson.
Mar Biol (Berl), Vol 21, No 2, p 86-90, 1973, Illus.

Descriptors: *Canals, *Turbulence, *Temperature, Mixing, Salinity, Biota, Barriers, Lakes.
Identifiers: Canal locks, Gatun Lake, Marine animals, *Panama, Sea, *Salanity-temperature profiles.

In discussions concerning the possible construction of a Panama sea-level canal it was assumed that Gatun Lake, part of the present canal, acts as a fresh-water barrier to the migration of marine animals from either end of the Canal to the other. Methodical documentary salinity determinations were not made previously and only a few surface salinity observations were recorded. Determinations of salinity-temperature profiles made in spring and fall, 1972, show essentially fresh water to be present from Miraflores Lake, through the Pedro Miguel Locks, through Gatun Lake, to, and including, the upper chambers of the Gatun Locks. With the exception of those of the lower chamber of the Miraflores Locks, and profiles indicate homogeneity and thorough vertical mixing of all water masses in the lock systems and lakes of the canal. Homogeneity of the water in the lock chambers is thought to be due to turbulence during filling of the chambers, to the 'piston-effect' of large ships moving into the chambers, to the action of ships' propellers and to density currents established as the lock gates are opened. Water in the approach channel at the Pacific end appears to be more homogeneous than that at the Atlantic end. The Panama Canal constitutes a fresh-water barrier to the migration of the stenohaline marine biota of the Pacific and Atlantic Oceans.--Copyright 1974, Biological Abstracts, Inc.
W75-08927

INTERTIDAL MACROBIOLOGY OF SELECTED STUDY BEACHES IN SOUTHERN CALIFORNIA,
University of Southern California, Los Angeles. Allan Hancock Foundation.
M. M. Patterson.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11551, $3.75 in paper copy, $2.25 in microfiche. Sea Grant Program, September 1974. 41 p, 9 tab, 8 fig, 20 ref.

Descriptors: *Beaches, *Invertebrates, *Numerical analysis, *Distribution, *Population, *Geomorphology, *Habitats, Benthos, Intertidal areas, Sands, Amphipods, Isopods, Mollusks, Insects, Slopes, Waves(Water), Sampling, Seasonal, Crabs, Environment, *California.
Identifiers: *Macrofauna.

Nine study beaches in southern California were sampled for an analysis of macroscopic fauna over a one year period. Statistical analysis was employed to elucidate the effects of zonation, seasonality and site physiography on the beach macrofauna. At the nine study beaches, there were more species and individual organisms associated with fine, homogeneous sand than with coarse, heterogeneous sand. Intertidal zonation is well-developed at the sheltered beach type, where gently inclined profiles are typical. The physical environment is most important in determining beach infauna with geographical and seasonal factors acting as complex variables. (Katz)
W75-08951

THE ENVIRONMENT OF OFFSHORE AND ESTUARINE ALABAMA,
Geological Survey of Alabama, University. Environmental Div.
R. L. Chermock, P. A. Boone, and R. L. Lipp.
Information Series 51, 1974. 135 p, 79 fig, 61 tab, 152 fig.

Descriptors: *Estuaries, *Coasts, *Alabama, Regional development, Bathymetry, Meteorology, Hydrology, Geology, Vegetation, Wildlife, Fisheries, Estuarine fisheries, Recreation, Planning, Saline water, Brackish water, Industries, Harbors, Population, *Estuarine environment, Water pollution control.
Identifiers: Geography.

Coastal Alabama has played an important historic role in the development of the state. Initially it provided safe harbor for vessels of early explorers in the northern Gulf of Mexico. This led to colonization and inland development. The navigable watercourses of the Tombigbee, Black Warrior, and Alabama Rivers were used for transportation. The Port of Mobile grew in importance until today it is one of the nation's leading ports. The growth of Mobile has been and will be related to inland development and its harbor facilities provided by access to the ocean. At the same time, its estuaries provide food and recreation for its people, and support an important seafood industry. New developments are underway or being considered that will further influence the growth of coastal Alabama. These include the Tennessee-Tombigbee Waterway, potential exploration for oil and gas in Alabama and federal off-shore waters, the construction of Ameraport, and the continued economic growth of the state. The expansion of industry, population, and harbor facilities in coastal Alabama will involve the State's offshore and estuarine waters. Problems will arise involving economic expansion and environmental disturbance. Available environmental information on Alabama's salt and brackish waters was summarized to provide a baseline for future studies of the environment of coastal and estuarine Alabama and indicate areas where additional research is needed. (Scott-ISWS)
W75-08961

DIRECT GRAVITATIONAL DRIVING AND TIDAL ENERGY BALANCE IN ELONGATED GULFS,
Scripps Institution of Oceanography, La Jolla, Calif.
G. G. Stock, and J. H. Filloux.
Journal of Physical Oceanography, Vol 5, No 2, p 376-379, April 1975. 3 fig, 1 tab, 4 ref. ONR Contract N00014-69-A-0200-6049.

Descriptors: *Tides, *Gulfs, *Tidal energy, *Model studies, Mathematical models, Friction, Velocity, Gravity, Ocean circulation, Oceans, Oceanography.
Identifiers: Gulf of California, Adriatic Sea.

Separation of oceanic and gravitational tidal driving in a linear one-dimensional model of an elongated gulf gave explicit expressions for the time-averaged energy equation. Tidal behavior was shown to depend on the interplay of four parameters: geometry, friction, and relative strength and phase of gravitational versus oceanic driving. In spite of its simplicity, the model accounts well for the various energy features of tides in the Adriatic Sea and the Gulf of California. (Sims-ISWS)
W75-08962

THE HEAT CONTENT OF THE UPPER OCEAN DURING COASTAL UPWELLING: OREGON, AUGUST 1973,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
R. K. Reed, and D. Halpern.
Journal of Physical Oceanography, Vol 5, No 2, p 379-383, April 1975. 2 fig, 10 ref. NSF AG-299.

Descriptors: *Upwelling, *Heat, *Oceans, *Coasts, Temperature, Heat transfer, Diffusion, Advection, Heat flow, Mixing, Model studies, Mathematical models, On-site data collections, Pacific Ocean, Oceanography, *Oregon.
Identifiers: Heat conservation, Heat content.

Data obtained at a time-series station during intense coastal upwelling off Oregon were applied to a model of heat conservation for the upper 8 m, and a thermal eddy diffusivity (horizontal) of 300 sq m/s was computed. Horizontal advection and horizontal diffusion both appeared to be more important than surface heat exchange in producing changes in heat content. Hourly changes in heat content were quite large, and it appeared that advection and diffusion varied appreciably in conjunction with changing tidal currents. (Sims-ISWS)
W75-08963

RADIOECOLOGY OF BOMBAY HARBOR--A TIDAL ESTUARY,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 5B.
W75-08964

CURRENT SURGES IN THE ST. GEORGES CHANNEL,
Institute of Oceanographic Sciences, Birkenhead (England).
M. J. Howarth.
Estuarine and Coastal Marine Science, Vol 3, No 1, p 57-70, 1975. 7 fig, 3 tab, 11 ref.

Descriptors: *Storm surge, *Currents(Water), *Channels, *On-site investigations, Storms, Winds, Velocity, Tidal waters, Water levels, Oceans, On-site data collections, Evaluation, Analytical techniques, Analysis, Meteorological data, Charts, Oceanography.
Identifiers: *St. Georges Channel, Irish Sea.

During February 1973, a period of unsettled weather, a rig of three recording current meters was moored in the center of the St. Georges Channel. Their records showed that four current surges occurred, each during a period of strong winds. These current surges were predominantly baratropic, were correlated to the calculated flow through the North Channel and were weakly correlated to changes in mean sea level. They each has two phases: the first in which water flowed southward out of the Irish Sea when the residual current was partly related to the wind; and the second in which water flowed northward, back into the Irish Sea. They also clearly showed that the phenomena observed inside the Irish Sea were dominated by outside events during the surges. (Humphreys-ISWS)
W75-08965

NITRIFICATION IN THE SCHELDT ESTUARY (BELGIUM AND THE NETHERLANDS),
Brussels Univ. (Belgium). Laboratorium voor Ekologie en Systematiek.
For primary bibliographic entry see Field 5B.
W75-08966

OBSERVATIONS OF BOTTOM-WATER FLUSHING IN A FJORD-LIKE ESTUARY,
National Science Foundation, Washington, D.C. Oceanography Section.
G. A. Cannon.
Estuarine and Coastal Marine Science, Vol 3, No 1, p 95-102, 1975. 6 fig, 7 ref.

Descriptors: *Estuaries, *On-site investigations, *Hydrography, *Tidal waters, Surveys, Measurement, Evaluation, Exploration, Currents(Water), Velocity, Salinity, Water temperature, Dissolved oxygen, Distribution patterns, Flow, *Washington, Sounds.
Identifiers: *Puget Sound(Wash), Bottom water flushing.

Currents were measured 2 m off the bottom on a 100-m deep sill of a basin within Puget Sound for a period of two months. During this time bottom water in the basin was replaced resulting in the older water being raised to shallower depths. Net motion into the estuary occurred during four intervals each of about five days duration. In-flow corresponded with minimum variance in the velocity fluctuations and minimum tidal currents. Out-flow occurred during maximum variance and tidal currents. The average speed during each of three of the five-day in-flow periods was about 6 cm/s and was approximately sufficient to replace all water below sill depth during the five days. (Humphreys-ISWS)
W75-08967

ANTIMONY IN THE COASTAL MARINE ENVIRONMENT, NORTH ADRIATIC,
Institut Rudjer Boskovic, Rovinj (Yugoslavia). Center for Marine Research.
For primary bibliographic entry see Field 5A.
W75-08968

MECHANISMS FOR DEEP WATER RENEWAL IN LAKE NITINAT, A PERMANENTLY ANOXIC FJORD,
Washington Univ., Seattle. Dept. of Oceanography.
R. J. Ozretich.
Estuarine and Coastal Marine Science, Vol 3, No 2, p 189-200, April 1975. 8 fig, 15 ref. NSF Grants GA-10084, GA-24875.

Descriptors: *Fjords, *Fishkill, *Anaerobic conditions, *Ocean circulation, *Structural geology, Oceans, Mortality, Water pollution effects, Fish, Wildlife conservation, Hydrographs, Meteorological data, Climatic data, Local precipitation, Nitrates, Sulfates, Hydrogen sulfide, *Canada, Tidal effects, Weather, Wind velocity, Salinity.
Identifiers: *Anoxic fjords, *Lake Nitinat(Brit Col), Renewal process.

Major deep water renewals, manifest by fish kills, were investigated. Meteorological and hydrographic observations of Lake Nitinat were made to separate the factors influencing renewal processes. Below average precipitation was found to be primarily responsible for renewals of 10-30% of the deep water volume between July 1968 and October 1970. (Henley-ISWS)
W75-08969

USE OF REMOTE SENSING FOR MAPPING WETLANDS,
Georgia Univ., Sapelo Island. Marine Inst.
R. J. Reimold, and R. A. Linthurst.
Transportation Engineering Journal, American Society of Civil Enginees, Vol 101, No TE2, Proceedings Paper 11293, p 189-198, May 1975. 4 fig, 14 ref, 1 append. National Sea Grant 04-3-158-6.

Descriptors: *Remote sensing, *Mapping, *Wetlands, *Estuaries, Aquatic plants, Land use, Natural resources, Oceanography, Photogrammetry, Tides, Transportation, Coasts, *Georgia, Water pollution, Beaches, Coastal engineering, Conservation, Dredging, Highways, Hydrology, Flow, Water quality, Water resources, Channels.

Contemporary remote sensing methodology and its application in wetlands was summarized. Using color, color infrared, black-and-white, and black-and-white infrared photography, multiband imagery, and infrared imagery, various applications were examined as they relate to wetlands use. Boundary mapping, vegetation differentiation, and plant primary production patterns have all been demonstrated with remote sensing. A new approach was presented for determination of intertidal water movement by infrared imagery in place of more costly time-consuming dye studies. Remote sensing also has been used in wetlands for location and field orientation, comparative analysis, landform analysis, and water pollution analysis. In terms of documenting baseline conditions for future litigation as well as planning purposes, remote sensing techniques afford the most reliable, least expensive, and least time-consuming means of accomplishing these tasks. (Dawes-ISWS)
W75-08977

ELECTROMAGNETIC FLOW SENSORS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 7B.
W75-08987

ACTINOMYCETALES ISOLATED FROM SAINT LOUIS BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-08993

INHIBITION OF DIATOM PHOTOSYNTHESIS BY GERMANIC ACID: SEPARATION OF DIATOM PRODUCTIVITY FROM TOTAL MARINE PRIMARY PRODUCTIVITY,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W75-09001

PHYTOPLANKTON ENRICHMENT EXPERIMENTS AND BIOASSAYS IN NATURAL COASTAL SEA WATER AND IN SEWAGE OUTFALL RECEIVING WATERS OFF SOUTHERN CALIFORNIA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W75-09019

THE USE OF ARTIFICIAL SUBSTRATES IN SAMPLING ESTUARINE BENTHOS,
York Univ., Downsview (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-09149

TOXICITY OF KRAFT MILL WASTES TO AN ESTUARINE PHYTOPLANKTER,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09159

TISSUE HYDROCARBON BURDEN OF MUSSELS AS POTENTIAL MONITOR OF ENVIRONMENTAL HYDROCARBON INSULT,
Naval Biomedical Research Lab., Oakland, Calif.
For primary bibliographic entry see Field 5B.
W75-09163

PROBLEMS IN C-14 DATING OF WATER FROM AQUIFERS OF DELTAIC ORIGIN--AN EXAMPLE FROM THE NEW JERSEY COASTAL PLAIN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-09183

NET PRIMARY PRODUCTIVITY OF PERIPHYTIC ALGAE IN THE INTERTIDAL ZONE, DUWAMISH RIVER ESTUARY, WASHINGTON,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5C.
W75-09189

NITROGEN CONTENT OF SHALLOW GROUND WATER IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-09232

TRANSIENT ANALYSIS OF WATER QUALITY IN THE DELAWARE ESTUARY SYSTEM VIA ONE-DIMENSIONAL INTRA-TIDAL TIME VARYING MODELS WITH APPLICATION TO THE IDENTIFICATION OF THE TIDAL DISPERSION COEFFICIENT USING DISCRETE SPACE CONTINUOUS TIME OCEAN SALINITY DATA,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering.
For primary bibliographic entry see Field 5B.
W75-09233

STORM TIDE FREQUENCY ANALYSIS FOR THE GULF COAST OF FLORIDA FROM CAPE SAN BLAS TO ST. PETERSBURG BEACH,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2B.
W75-09268

MATHEMATICAL MODELING OF NEAR COASTAL CIRCULATION,
Massachusetts Inst. of Tech., Cambridge.
J. D. Wang, and J. J. Connor.
Report No MITSG 75-13, April 1975 272 p, 90 fig, 16 tab, 81 ref.

Descriptors: *Mathematical models, *Model studies, *Coasts, *Ocean circulation, Discharge(Water), Hydrodynamics, Oceanography, Finite element analysis, Numerical analysis, *Boundary processes.
Identifiers: *Hydrodynamic circulation, One layered situation, Two layered situation, Boundary conditions, Variational statements.

Hydrodynamic circulation in coastal waters is formulated in terms of mathematical models. The derivation of a set of governing equations, expressing conservation of mass and momentum is discussed. A simplification is introduced by integrating all variables and equations over the total water depth. The derivation of the vertically integrated formulation for one and two layered situations is discussed along with the underlying assumptions and closure problems. The treatment of boundaries and boundary conditions is given particular attention. By analogy to the mechanics of a particle, it is postulated that the admissible boundary conditions must either be in terms of forces or discharges. (NOAA)
W75-09273

VARIATIONS IN THE HYDROGRAPHIC STRUCTURE OF PRINCE WILLIAM SOUND,
Alaska Univ., College. Inst. of Marine Science.
R. D. Muench, and C. M. Schmidt.
IMS Report R75-1, Sea Grant Report R75-1, (1975). 135 p, 72 fig, 15 ref. 04-3158-41(OSG).

Descriptors: *Estuarine environment, *Hydrography, *Measurements, *Surveys, Temperature, Density, Salinity, Circulation, Mixing, Meteorology, Estuaries, Management, Data collections, *Alaska.
Identifiers: *Prince William Sound(Alas), *Hydrographic data, *Gulf of Alaska, Trans-Alaskan pipeline, Deep-water renewal processes.

Prince William Sound, a complex fjord-type estuarine system located off the northern Gulf of Alaska, is one of the larger North American estuarine systems not presently influenced by metropolitan activities. However, within the next decade, the Sound faces major development as the receiving-loading area for the trans-Alaskan pipeline, recreational and urban stresses from Anchorage, and increasing pressure from commercial fishermen. Physical oceanographic conditions in the Sound are analyzed to provide information which can be used in making management decisions and planning specific research in the region. Described are the distribution of temperature, salinity, and density; mixing processes and circulation; deep-water renewal processes; and seasonal variations in hydrographic conditions. (NOAA)
W75-09274

ENVIRONMENTAL STUDY OF THE MARINE ENVIRONMENT NEAR NOME, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
D. W. Hood, V. Fisher, D. Nebert, H. Feder, and G. J. Mueller.
Institute of Marine Science Report 74-3, Sea Grant Report 73-14, July 1974, 265 p. NSF GD-31610, OSG 04-3-1581-41.

Descriptors: *Aquatic environment, *Sedimentation, Aquatic life, Hydrography, Water circulation, Trace elements, Marine biology, Oceanography, Data collections, Economics, *Baseline data studies, *Alaska, Metals.
Identifiers: *Marine environment, *Nome(Alas), Water column primary productivity, Trace metals.

The purpose was to collect baseline data to define the sedimentary, biological, and physical-chemical environments in the vicinity of Nome. The investigation included: a determination of the surficial bottom sediments including suspended sediment loads and trace metal content of the sediments; the collection and identification of bottom dwelling organisms; a few estimates of water column primary productivity; studies of the hydrography circulation patterns and oxygen distributions, the nutrient levels and trace metal content of the water column, and the socio-economic status of the town of Nome. (NOAA)
W75-09275

NEW YORK BIGHT PROJECT, WATER COLUMN SAMPLING CRUISES NO 6-8 OF THE NOAA SHIP FERREL, APRIL - JUNE 1974,
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine EcoSystems Analysis Program.
J. B. Hazelworth, B. L. Kolitz, R. B. Starr, R. L. Charnell, and G. A. Berberian.
NOAA Data Report MESA-1, January 1975. 177 p, 7 fig, 2 tab, 9 ref.

Descriptors: *Data collections, *Marine biology, *Marine geology, Chemistry, Physics, Oceanography, Instrumentation, *Sampling, Remote sensing, Cruises, New York.
Identifiers: *Marine ecosystem, *New York Bight, Satellite monitoring, Water column, Sediment chemistry.

During the period April-June 1974, three oceanographic cruises, denoted 6, 7, and 8, were made by the NOAA ship Ferrel in the New York Bight. The objective of the cruises was to supply data to provide a base for analysis of the water movements on the highly impacted ecosystem. The corrected physical and chemical data from these cruises are presented and the parameters measured, the measurement methods, and the corrections applied to the data are described. (NOAA)
W75-09277

ASSESSMENT OF OFFSHORE DUMPING; TECHNICAL BACKGROUND: PHYSICAL OCEANOGRAPHY, GEOLOGICAL OCEANOGRAPHY, CHEMICAL OCEANOGRAPHY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 5B.
W75-09278

PUBLIC RIGHTS IN GEORGIA'S TIDELANDS,
Georgia Univ., Athens. Inst. of Government.
For primary bibliographic entry see Field 6E.
W75-09281

HURRICANES ON THE TEXAS COAST: DESCRIPTION AND CLIMATOLOGY (1),
Texas A and M Univ., College Station. Center for Applied Geosciences.
For primary bibliographic entry see Field 2B.
W75-09283

HURRICANES ON THE TEXAS COAST: THE DESTRUCTION (2),
Texas A and M Univ., College Station. Center for Applied Geosciences.
For primary bibliographic entry see Field 2B.
W75-09284

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DEVELOPMENT OF A LOW-COST TUBULAR REVERSE OSMOSIS MODULE FOR ONE-PASS SEA WATER DESALTING,
Abcor, Inc., Cambridge, Mass. Walden Research Div.
A. Zakak, P. Hoover, A. Gollan, and R. L. Goldsmith.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 967, $4.25 in paper copy, $2.25 in microfiche. OWRT Report INT-OSW-RDPR-75-1004, June 1975. 55 p, 16 tab, 10 fig, 7 ref, 2 append. 14-30-3251.

Descriptors: *Desalination, *Membranes, *Reverse osmosis, *Permeation, Sea water, Membrane processes.
Identifiers: *Tubular membranes, Tubular supports, Polyethylene imine, Toluene diisocyanate, *Membrane casting, Bubble test, Polysulfone support.

The ultimate program objective was the development of a low cost tubular module assembly applicable for the high system pressure operation commensurate with seawater desalination. Preliminary tests revealed that the casting procedure for the flat sheet NS-1 membrane was not readily adaptable to the casting of tubular membrane configurations. The probram was therefore reoriented towards the development of a modified casting procedure to yield both target desalination characteristics as well as acceptable membrane reproducibility. The studies have culminated in a revised, and practical, casting method for the 1/2 in NS-1 membrane tubes. The major modification to the flat sheet casting procedure utilized a post treatment step which resulted in reproducible high quality membranes.
W75-09049

EVALUATION OF POTENTIAL SPACECRAFT WASH WATER PRETREATMENT SYSTEMS,
Abcor, Inc., Cambridge, Mass. Walden Research Div.
For primary bibliographic entry see Field 5D.
W75-09050

3B. Water Yield Improvement

AN OUTLINE SCHEME FOR RE-USE OF MOGDEN SEWAGE EFFLUENT,
Fish (Robert) and Partners, London (England).
For primary bibliographic entry see Field 5D.
W75-08877

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Sciences.
J. R. Meiman, and T. L. Dietrich.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 101, No IR1, p 41-52, March, 1975. 6 fig, 5 tab, 10 ref.

Descriptors: *Water yield improvement, *Watershed management, *Vegetation effects, *Snowpacks, *Lodgepole pine trees, Snowfall, Soil water, Evapotranspiration, Water balance, *Colorado, Forest watersheds, Hydrology.
Identifiers: Patch cutting.

Lodgepole pine comprises a large segment of the snowpack zone in the Colorado Front Range and has a significant influence on water yields. The purpose of this study was to determine the effect of small patch cuts of less than 1 acre on the water balance of a lodgepole pine stand. Results showed a significant increase in the soil water on the cut areas; a trend for less snow on the cut areas during a low snowfall year and more snow on the cut areas during a high snowfall year; and on the basis of the first hydrologic year of the study, a very high potential for water yeild increases by patch cutting. Because of assumptions involved in estimating water yield from soil water measurements and snow distribution, the potential for water yield by patch cutting should be evaluated using gaged calibrated watersheds. (Mastic-Arizona)
W75-08947

EARTH-DAM SEEPAGE AND RELATED LAND WATER PROBLEMS,
Dames and Moore, Phoenix. Ariz.
For primary bibliographic entry see Field 4A.
W75-08973

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
J. R. Meiman, and T. L. Dietrich.
Journal of the Irrigation and Drainage Division, Proceeding of American Society of Civil Engineers, Vol 101, No IR1, Proceedings Paper 11197, p 41-52, March 1975. 6 fig, 5 tab, 10 ref, 1 append. US Bur Rec Contract CSU-14-06-D-6598.

Descriptors: *Lodgepole pine trees, *Snow, *Hydrology, Snow cover, Soil water, Vegetation effects, Water resources, Water yield improvement, Streamflow, Field capacity, Hydrologic aspects, Snowpacks, Colorado.
Identifiers: *Paired plot studies, *Colorado Front Range.

Paired plot studies of soil water and snow water equivalents were conducted from 1968-1973 in the lodgepole pine type on the eastern slope of the Colorado Front Range at an elevation of 9000 feet. Small patch cuts ranging in size from 0.29 to 0.61 acre were cut in the fall of 1971. Based on analysis of precut and postcut relationships to the paired control plots, the average increase in water potentially available for streamflow from the cut areas was 4.6 inches. Changes in distribution of snow on a relatively small part of the cut areas accounted for 21% of the increase. There were no significant changes in potential water yields from the adjacent uncut forest. Although the results were site-specific and for only the first full hydrologic year after treatment, there did not appear to be a very high potential for water yield increase by small patch cuts from sites similar to those studied. (Roberts-ISWS)
W75-09198

THE PARADOX OF PLANNED WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
S. A. Changnon, Jr.
Bulletin American Meteorological Society, Vol 56, No 1, p 27-37, January 1975. 2 fig, 1 tab, 73 ref. NSF Grant GI-37859.

Descriptors: *Weather modification, *Federal project policy, Fog, Snow, Tropical regions, Rain, Cloud seeding, Precipitation(Atmospheric), Social aspects, Economics, Climatology, Weather.

A paradox has developed involving sizable reductions during the last two years in federal support of weather modification as opposed to major scientific-technical advances in and strong recommendations for increased federal support from the scientific community. Many possible causes for the paradox appear, including fear of weather changes, lack of scientific commitment, and a series of public, scientific, political, and military controversies. The three basic issues are that weather modification is still an immature technology, the socio-economic impacts are ill defined, and its management has been uncertain. Proper resolution of the paradox is more apt to occur either because of a dramatic scientific breakthrough or from growing concerns about weather and climate-related environmental changes. (Jones-ISWS)
W75-09209

SOME PROBLEMS IN THE APPLICATION OF SYSTEMS ANALYSES IN WATER RESOURCES SYSTEMS,
Office of Science and Technology, Washington, D.C.
W. A. Hall.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 407-417. 15 ref.

Descriptors: *Systems analysis, *Optimization, *Mexico, *Agricultural engineering, *Water resources, *Surface-groundwater relationships, Hydrology, Infiltration, Precipitation(Atmospheric), Infiltrometers, Arid lands, Agricultural watersheds, Runoff.
Identifiers: RIsk minimization, Micro watersheds.

A general discussion of systems analysis of water resources problems was presented as well as specific problems to which systems analysis is applied. The general discussion included comparisons of scientific approaches versus engineering approaches. Example was made of an arid portion of Mexico in which the goal was to increase the per capita income. The development of a simple idea, i.e., as a watershed decreases in size the percent of precipitation appearing as runoff increases, was carried through a series of experiments into actual practice. Optimization by maximizing profit was demonstrated, but it was also shown that minimizing risk in a marginal economy may be more important. (See also W75-09210) (Terstriep-ISWS)
W75-09226

PREAUTHORIZATION PLANNING ACTIVITIES OF THE BUREAU OF RECLAMATION, THE CORPS OF ENGINEERS AND THE SOIL CONSERVATION SERVICE FOR FISCAL YEAR 1975.
For primary bibliographic entry see Field 4A.
W75-09244

POST AUTHORIZATION PROJECT ACTIVITIES ANNUAL STATUS REPORT - BUREAU OF RECLAMATION.
For primary bibliographic entry see Field 4A.
W75-09245

WEATHER MODIFICATION GRANTS.
Hearing--Subcomm. on Agricultural Research and General Legislation, Comm. on Agriculture and Forestry, U.S. Senate, 93d Cong, 2d Sess, August 19, 1974. 139 p, 20 fig, 6 map, 1 tab, 9 chart, 32 ref.

Descriptors: *Weather modification, *Droughts, *Water shortage, *Grants, Crops, Artificial precipitation, Artificial storms, Cloud seeding, Agroclimatology, Climatology, Cloud physics, Meteorology, Precipitation(Atmospheric), Rain, Storms, Water supply, Weather, Weather data, Legislation, Climatic data, Federal government, Research and development, Livestock, Programs.
Identifiers: Weather modification grants, Congressional hearings.

Hearings were held on S.3313 which is a bill to authorize the administrator of the Environmental Protection Agency to carry out an emergency assistance program to assist states in relieving severe drought conditions that threaten to destroy livestock or crops. Further, the bill authorizes financial grants to states for the purpose of assisting and initiating weather modification measures. Statements of numerous commentators representing government, public, and private interest groups are presented. Miscellaneous documents reprinted from articles on weather modification programs to alleviate drought are included. Proponents of the bill suggest that it will improve present programs by providing for coordinating and monitoring as well as cost sharing of operational weather modification programs. The central concern is to avoid economic disasters which accompany droughts by preventing droughts before they occur. (Fernandez-Florida)
W75-09259

DECENTRALIZED WATER REUSE SYSTEMS IN A WATER SCARCE ENVIRONMENT: THE TOURIST INDUSTRY IN ST. THOMAS, VIRGIN ISLANDS,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W75-09297

ECOLOGY OF INDIAN DESERT: VIII. ON THE WATER RELATIONS AND ASSIMILATE BALANCE OF SOME DESERT PLANTS,
Jodhpur Univ. (India). Dept. of Botany.
T. Mathur, and D. N. Sen.
Ann Arid Zone, Vol 11, No 1/2, p 18-30, 1972.

Descriptors: Asia, *Plant ecology, Deserts, Water balance, *Desert plants, Soil moisture.
Identifiers: Calotropis-procera, *India(Rajasthan), Prosopis-cineraria, Prosopis-juliflora, Tephrosia-purpurea, Polysaccharides, Monosaccharides.

A study on the water relations and the assimilate balance of 4 desert plant species has been made after the rains were over and the dry period started in Western Rajasthan (India) for a period of 4-6 mo. It was observed that a reduction in the water loss and stomatal openings took place when the soil water decreased. The percentage of absolute moisture in Calotropis procera were found to be the maximum among the 4 spp., probably because of latex. It was minimum in Prosopis cineraria. The percentage of relative water content of P. cineraria, Prosopis juliflora and Tephrosia purpurea decreased, but in C. procera increased with decrease in soil moisture. The polysaccharides were detected only in Nov. and the presence of monosaccharides in summer months had led to a high osmotic potential, resulting in an echanced water uptake. The values of total N do not appear to show any particular trend in relation to the sur-

vival or otherwise of these desert plant species.--Copyright 1974, Biological Abstracts, Inc.
W75-09322

3C. Use Of Water Of Impaired Quality

IRRIGATION WITH WASTE WATER AT BOARD OF WORKS FARM, WERRIBEE,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 5D.
W75-08941

RESPONSE OF ASPEN TO IRRIGATION BY MUNICIPAL WASTE WATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. K. Murphey, and J. J. Bowier.
Tappi, Vol 58, No 5, p 128-129, May 1975. 4 ref, 2 tab.

Descriptors: *Aspen, *Municipal wastes, *Crop response, *Irrigation effects, Waste disposal, Water pollution sources, Irrigation, Fibers(Plant), Forest management, Irrigation practices, Water reuse, Forestry.
Identifiers: *Populus tremuloides, Fiber length, Specific gravity, Pulpwood.

American quaking aspen (Populus tremuloides), viewed as a pulpwood species, responded favorably to treatment with effluent from municipal sewage treatment plants. Average annual increment and fiber length were different for irrigated and control samples at the 1% level of significance. Differences did not occur among annual increments at the same height within treatment groups, but height in the bole did show an effect. Average annual increment in the crown was significantly larger than at either mid-bole or base. Specific gravity at the base of the bole was greater than at the other two locations. Fiber length in irrigated trees was greater in the crown than at the other locations. In the control trees, the length of fibers in the base was lower than in the two upper regions. The increase in fiber length in the irrigated trees produced a better fiber length-to-width ratio which is considered advantageous to pulp strength. (Sykes-IPC)
W75-09342

3D. Conservation In Domestic and Municipal Use

SOURCES OF EMERGENCY WATER SUPPLIES IN SAN MATEO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 6D.
W75-08911

RECONNAISSANCE OF THE WATER RESOURCES OF THE OKLAHOMA CITY QUADRANGLE, CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W75-08912

PLANT SCALE STUDIES OF THE MAGNESIUM CARBONATE WATER TREATMENT PROCESS,
Black, Crow and Eidsness, Inc., Montgomery, Ala.
For primary bibliographic entry see Field 5F.
W75-08939

COMPARATIVE EVALUATION OF THREE URBAN RUNOFF MODELS,
Canada Centre for Inlands Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W75-08988

STUDIES IN ENVIRONMENT - VOLUME III, POLLUTION AND THE MUNICIPALITY,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09055

COLLIER COUNTY WATER MANAGEMENT ORDINANCE.
For primary bibliographic entry see Field 6E.
W75-09260

3E. Conservation In Industry

THE BASIC TECHNOLOGY OF THE PULP AND PAPER INDUSTRY AND IT'S WASTE REDUCTION PRACTICES,
Lakehead Univ., Port Arthur (Ontario).
For primary bibliographic entry see Field 5D.
W75-09334

3F. Conservation In Agriculture

BIOLOGICAL FERTILIZER PRODUCTION - BY TREATMENT OF SEWAGE SLUDGES WITH SULFITE LIQUORS.
For primary bibliographic entry see Field 5D.
W75-08863

ON THE DIRUNAL VARIATION OF LEAF WATER CONTENT ON AN AREA BASIS IN THE RICE PLANT, IN JAPANESE,
Tokyo Uniur of Agriculture and Technology (Japan). Faculty of Agriculture.
Kuni Ishihara, Yasuyuki Ishida, and Tadaharu Ogura.
Proc Crop Sci Soc Jpn, 43(1): 77-82, Illus. 1974. English summary.

Descriptors: *Rice, Leaves, Cerea crops, Field crops, *Diurnal, *Consumptive use, Diurnal distribution, *Environmental effects, *Biorhythms.

An investigation was undertaken to clarify the diurnal variation of leaf water content on an area basis in some developmental stages of rice plants under various weather conditions. Maximal water content was obtained for the 12th and 13th leaves, fully expanded just at the panicle formation stage. The water content decreased more and more for both upper and lower leaves further from the relevant leaves. The water content of each successive leaf followed the diurnal variation pattern of reaching the maximal value in early morning and decreasing towards noon, but the range of variation was wider at the tillering stage, becoming narrower after the booting stage. The midday decrease of water content was rather remarkable on fine days accompanied with intense transpiration, but the difference of diurnal variation between fine and cloudy days was small as was expected. It is suggested that the water content of rice plants grown in submerged conditions did not decrease below a certain limit, owing perhaps to the increase of water absorption in accordance with intensive transpiration or stomatal closure due to the decrease of water content. In the afternoon of fine days, stomatal aperture became much smaller than on cloudy days. It was considered that the slight variation of water content had much influence upon stomatal aperture when water content on leaf blade decreased to a certain limit and that this influence became more prominent after the booting stage with a narrower range of the variation of water content. The dry weight/leaf area was much larger in fine days compared with cloudy days, suggesting the effect of dry weight increase upon the decrease of customary leaf water content on a dry weight or fresh weight basis.--Copyright 1975, Biological Abstracts, Inc.
W75-08904

CONTENT OF THE TRACE ELEMENTS COPPER AND MANGANESE IN STREAM WATER, SOIL, AND PLANTS IN SOUTHERN UKRAINE, (IN RUSSIAN),
Odesskii Meditinskii Institut (USSR).
For primary bibliographic entry see Field 5B.
W75-08907

AN ECONOMIC ANALYSIS OF THE EFFECTS OF A DECLINING GROUND WATER LEVEL IN THE RAFT RIVER BASIN, CASSIA COUNTY, IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.
W75-08921

HOW WATER BRINGS THE DESERT TO LIFE,
S. Shapiro, and H. E. Shapiro.
Reclamation Era, Vol 60, No 2, p 1-7, Spring, 1974. 9 fig.

Descriptors: *Arid lands, *Irrigation, *Deserts, *Irrigation programs, *Arizona, Desert plants, Hydroelectric plants, Dams, Reclamation, Water wells
Identifiers: *Salt River Project(Ariz), Montezuma Well(Ariz).

The Salt River Project is the first Federal multipurpose reclamation project, begun in 1903, with Roosevelt Dam as the main feature. Other dams, canals, and power plants were added to meet the rapid growth of Phoenix, Arizona. Another area where water has played a significant role in bringing life to the desert is the Verde Valley, where water comes from Montezuma Well, a natural limestone sink, 55 feet deep and 470 feet wide. Water enters the well from underground springs at a rate of 1.5 million gallons daily. Most of the water is used for irrigation argiculture in the valley below. Water can be brought to the desert and used for constructive purposes while maintaining the natural beauty of the desert. (Mastic-Arizona)
W75-08942

WATER CONSERVATION THROUGH PROPER TIMING OF SOYBEAN IRRIGATION,
Kansas State Univ., Manhattan. Evapotranspiration Lab.
R. A. Brady, L. R. Stone, C. D. Nickell, and W. L. Powers.
Journal of Soil and Water Conservation, Vol 29, No 6, p 266-268, November-December, 1974. 1 fig, 2 tab, 7 ref.

Descriptors: *Soybeans, *Irrigation efficiency, *Soil moisture, *Timing, *Water conservation, Irrigation, Nuclear moisture meters, Gravimetric analysis, Crop production.

Soybean yield, lodging, and yield increase resulting from irrigation applied at various stages of plant growth when soil moisture declined to predetermined levels were evaluated over a 2-year period. Soil moisture was measured using neutron moderation and gravimetric sampling techniques. Results were: (a) one-third to one-half of the water necessary for full season irrigation produced equally good yields; (b) yields increased about 20 percent; (c) water was used most efficiently when irrigation was initiated in the podding stage or at the 60 to 65 percent soil moisture depletion level in the vegetative or flowering stages; and (d) low irrigation efficiencies correspond to high lodging scores which could result in reduced yields when machine harvested. (Mastic-Arizona)
W75-08943

BASIC ELEMENTS OF DRIP IRRIGATION,
California Univ., Riverside.

A. W. Marsh, R. L. Branson, C. D. Gustafson, and S. Davis.
Irrigation Journal, Vol 24, No 3, p 22-23, May/June, 1974. 1 fig.

Descriptors: *Irrigation systems, *Saline water, *Irrigation design, *Soil water movement, Fertilization, Salinity, Sands, Soil surfaces, Runoff, Flow rates, Infiltration.
Identifiers: *Drip irrigation.

Drip irrigation is frequent slow application of water to soil through mechanical devices called emitters located at select points along water delivery lines. The application must be slow enough so that flow across the soil surface is limited and no runoff occurs. The key element in the system is the emitter which provides the slow flow needed, and can be placed either directly on the soil which provides th slow flow needed, or buried at a shallow depth. The main attraction of drip irrigation has been the potential for reduced operating costs. Other advantages include the system's ability to inject fertilizers directly into the irrigation water; to maintain a relatively stable soil moisture condition; and to permit the use of more saline water than can be used by other irrigation systems. Some disadvantages center around salinity problems. The emitter outlets may become plugged by mineral or organic matter particles or by dissolved salts which may crystalize around the openings if water movements are too slow or are reversed. Sandy soils are probably best adapted for drip irrigation. (Mastic-Arizona)
W75-08944

CONTROLLED SUBSURFACE DRAINAGE FOR SOUTHERN COASTAL PLAINS SOIL,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-08972

STUDIES ON SOIL INSECTICIDES: XII. EFFECT OF TEMPERATURE AND SOIL MOISTURE ON THE BIOACTIVITY OF SOIL INSECTIDES,
Higher Agricultural Inst., Mushtuhur (Egypt). Dept. of Plant Protection.
For primary bibliographic entry see Field 2G.
W75-08999

GEOPHYSICAL EXPLORATION OF GROUNDWATER IN SOFT FORMATIONS AND ITS UTILIZATION IN MINOR IRRIGATION,
Indian Inst. of Tech., Kharagpur. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 4B.
W75-09103

A SIMPLE SOIL WATER SIMULATION MODEL FOR ASSESSING THE IRRIGATION REQUIREMENTS OF WHEAT,
Israel Meteorological Service, Bet-Dagan.
J. Lewin.
Isr J Agric Res. 22(4): 201-213. Illus. 1972.

Descriptors: *Wheat, *Soil water, *Model studies, Crops, *Simulation analysis, Rainfall, Evaporation, Crop production, *Irrigation efficiency, Evaluation.

A model was developed to estimate daily soil moisture changes under a wheat crop, using crop and soil characteristics and data of Class A pan evaporation and of rainfall. Soil water depletion by evapotranspiration was estimated, using an empirical linear relation between daily soil moisture depletion and the soil moisture content of the top 90-cm layer. Wheat yield reduction was assumed to be directly related to the length of time that the soil moisture decreased below an empirically chosen critical level during the growth period. Predicted soil moisture and wheat yield values were found to agree with measured values, and the model was used to calculate the probability of different levels of yield for a number of irrigation treatments, on the basis of long-term rainfall data.--Copyright 1974, Biological Abstracts, Inc.
W75-09152

EFFECTS OF ROOT MEDIUM AND WATERING ON TRANSPIRATION, GROWTH AND DEVELOPMENT OF GLASSHOUSE CROPS: I. EFFECTS OF COMPRESSION AT VARYING WATER LEVELS ON PHYSICAL STATE OF ROOT MEDIA AND A TRANSPIRATION AND GROWTH OF TOMATOES,
State Experiment Station Landvik, Grimstad (Norway).
For primary bibliographic entry see Field 2D.
W75-09162

SIMULATION MODEL FOR EVAPOTRANSPIRATION OF WHEAT: EFFECT OF EVAPORATIVE CONDITIONS,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 2D.
W75-09196

EFFECT OF FERTILIZER APPLICATION ON REGENERATION OF NATURAL GRASSLANDS IN COASTAL PARTS OF MAHARASHTRA,
College of Agriculture, Poona (India). Botany Section.
For primary bibliographic entry see Field 2I.
W75-09231

RELATION OF SOIL WATER POTENTIAL TO STOMATAL RESISTANCE OF SOYBEAM,
Kansas State Univ., Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 2D.
W75-09235

WEATHER CONDITIONS AND SCREWWORM ACTIVITY,
National Weather Service, University Park, Pa.
J. J. Rahn, and G. L. Barger.
Agric Meteorol, Vol 11, No 2, p 197-211, 1973. Illus.
Identifiers: Cochliomyia-hominivorax, *Screwworms, Temperature, *Weather, *Pest eradication, *Pest control.

The screwworm (Cochliomyia hominivorax) has been a serious economic pest in southean sections of the USA for many years. Recently, USA Department of Agriculture eradication program significantly reduced the number of reported infestations in the Southwest, although periodic outbreaks continue to occur. The relationship between reported screwworm cases and weather conditions was investigated, with the objective of establishing guidelines for the use of real-time weather data as input to the eradication program. Because of several complicating factors the results were larely qualitative. The screwworm activity/rainfall relationship was quite variable. Periods of moderate or heavy precipitation were often followed within several weeks by an increase in reported screwworm cases. In other instances, there were wet periods with no resulting increase in screwworm activity. Some of this believed due to a temperature factor, since insect activity appeared to be diminshed by extremely high temperatures. A critical threshold temperature of approximately 95F was suggested. Palmer Crop Moisture Index (CMI) values were useful indicator of screwworm activity, with above normal CMI values often, but not always, associated with increased infestation reports in following weeks. Periods of moderate or heavy rainfall, or persistent light precipitation, accompanied by temperatures remaining below the mid-90's should be a signal to the eradication program of an increased potential for screwworm outbreaks.--Copyright 1973, Biological Abstracts, Inc.
W75-09318

EFFECT OF GYPSUM AND MANURE ON THE GROWTH OF WHEAT IRRIGATED WITH BICARBONATE RICH WATER,
Rajasthan Salinity Lab., Jodhpur (India).
S. S. Puntamkar, P. C. Mehta, and S. P. Seth.
J Indian Soc Soil Sci, Vol 20, No 3, p 281-285, 1972.

Descriptors: *Irrigation effects, *Wheat, *Gypsum, Calcium compounds, Sulfur compounds, Inorganic compounds, *Farm wastes, *Crop production, Cereal crops, Field crops.
Identifiers: Bicarbonate-rich water.

A field experiment was conducted to study the effect of gypsum at 5, 10 and 20 tons/ha and manure at 15 and 30 tons/ha, respectively, alone or with irrigation with bicarbonate rich water. Gypsum and manure increased the yield of wheat ('Sonora 64'); the highest yield of wheat was recorded with 20 tons of gypsum alone. Combined gypsum and manure were less valuable than the highest dose of gypsum alone. Exchangeable Na decreased by 1.6-10.9% while exchangeable Ca increased up to 17.7%.--Copyright 1973, Biological Abstracts, Inc.
W75-09321

COMPARING THE EFFECTS OF IRRIGATION AND NITROGENOUS FERTILIZERS ON THE YIELD, QUALITATIVELY AND QUANTITATIVELY, OR VARIOUS VARIETIES OF MAIZE: II. YIELD OF PROTEIN, (IN FRENCH),
Institut National de la Recherche Agronomique, Toulouse (France). Station d'Agronomie.
J. Decau, and B. Pujol.
Ann Agron (Paris), Vol 24, No 3, p 359-373, 1973. English summary.

Descriptors: Corn(Field), *Irrigation effects, *Fertilizers, *Nitrogen compounds, Nutrients, *Crop production, *Proteins, *Yield equations, Grains(Crops), Field crops, Crops.
Identifiers: Maize, Yield.

An opaque mutant maize 2(O sub 2), subjected to various nitrogenous feeding conditions, chiefly in dry crops, reacts more markedly than natural maizes (+) and has a higher protein content (N x 6.25). However, the yield of both grains and nitrogenous matter per acre of maize (+) remains higher than the mutant's. The range of protein content in the mutant is larger, (Fertilizing variations being comparable) in dry than in wet crops, 8.6-12.6 and 8.9-11.8, respectively. When both maizes are equally heavily fertilized, the protein content of the irrigated-maize grain is lower than that of the dry crop. To explain this, the relative effects of nitrogenous fertilizing and of irrigation on N absorption on the plant yield of both protein and the total dry matter, and the same irrigation effects on the compared migration of the proteins and the other substances to the grain are dealt with. The comparatively lower capability of nitrogenous substances to shift towards the grain, compared with that of ternary compounds apparently stems from the different nitrogenous enrichment of the grain that was observed.--Copyright 1974, Biological Abstracts, Inc.
W75-09331

PROCEEDINGS TALL TIMBERS CONFERENCE ON ECOLOGICAL ANIMAL CONTROL BY HABITAT MANAGEMENT, NO. 4.
Tall Timbers Research Station, Tallahassee, Fal.
For primary bibliographic entry see Field 2I.
W75-09333

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

WATER RESOURCES INVENTORY OF CONNECTICUT--PART 5, LOWER HOUSATONIC RIVER BASIN,
Geological Survey, Hartford, Conn.
W. E. Wilson, E. L. Burke, and C. E. Thomas, Jr.
Connecticut Water Resources Bulletin No 19, 1974. 79 p, 60 fig, 4 plate, 29 tab, 110 ref.

Descriptors: *Water resources, *Connecticut, Surface waters, Groundwater, Hydrologic data, Data collections, Water yield, Hydrogeology, Streamflow, Glacial drift, Aquifers, Maps.
Identifiers: *Housatonic River(Conn).

The lower Housatonic River basin in western Connecticut includes the basins of two major tributaries, the Pomperaug and Naugatuck Rivers. Almost half the precipitation--21.6 inches--was lost from the basin by evapotranspiration. Except for small amounts exported, the remainder dicharged as runoff and underflow into Long Island Sound. Variations in streamflow at 6 long-term continuous-record gaging stations are summarized in standardized graphs and tables. Of the 37 principal lakes, ponds, and reservoirs in the basin, 6 have usable storage of more than 1 billion gallons. Water can be obtained from three aquifers underlying the basin--stratified drift, till, and bedrock. Groundwater supplies generally range in yield from several millions tof gallons per day from large well fields to 1 gpm from single wells. Large supplies, with yields of 100 gpm or more from individual wells, are most commonly obtained from stratified drift. Small to moderate water supplies can be obtained from any of the aquifers under suitable conditions. Where unaffected by man's activities, water in the basin is generally low in dissolved-solids concentration, is of the calcium magnesium bicarbonate type, and is soft to moderately hard. Man's activities have degraded the quality of water in streams in much of the basin, except in the Pomperaug subbasin. The quantity and quality of water in the basin are satisfactory for a wide variety of uses, and, with suitable treatment, the water may be used for most purposes. (Knapp-USGS)
W75-08905

SUMMARY OF HYDROLOGIC DATA COLLECTED DURING 1973 IN DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W75-08908

SUMMARY STATEMENTS OF WATER RESOURCES INVESTIGATIONS IN FLORIDA, 1974-75.
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W75-08909

WATER RESOURCES OF WISCONSIN, LOWER WISCONSIN RIVER BASIN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08913

WATER RESOURCES OF HAMILTON COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08914

HYDROLOGIC UNIT MAP--1974, STATE OF MICHIGAN.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08916

HYDROLOGIC UNIT MAP--1974, STATE OF SOUTH CAROLINA.
Geologic Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08917

HYDROLOGIC UNIT MAP--1974, STATE OF VIRGINIA.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08918

HYDROLOGIC UNIT MAP--1974, STATE OF NEW YORK.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08920

EROSION-PROOFING DRAINAGE CHANNELS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W75-08925

OPTIMAL TIMING, SEQUENCING, AND SIZING OF MULTIPLE RESERVOIR SURFACE WATER SUPPLY FACILITIES,
California Univ., Los Angeles. Dept. of Engineering Systems.
L. Becker, and W. W-G. Yeh.
Water Resources Research, Vol 10, No 1, February 1974, p 57-62. 3 fig, 4 tab, 18 ref. (California Water Resources Center Project UCAL-WRC-W-338). OWRR A-040-CAL(2).

Descriptors: *Time series analysis, Timing, Water supply, Surface waters, *California, *Optimization, *Multiple-purpose reservoirs.
Identifiers: *Eel River(Calif).

A method is outlined whereby the timing, sequencing, and sizing of a water supply development is validly performed. The method takes care of the vital fact that although it is firm water that is demanded or sold, it is reservoir capacity at a particular site that is costed, and the two are not simply related, nor is the relationship independent of previously constructed reservoirs and the stream-reservoir configuration. A feature of this method is a simple firm water determination concept that is applicable to any stream-reservoir configuration and that uses rational and reasonable operating rules at each basic time period for the calculations of reservoir storage changes resulting from excess or deficit streamflows relative to demand in those periods. Details of interchanges of water between reservoirs are not relevant to this concept. Streamflows are taken to be the subnormal flow hydrographs that would correspond to a critical period analysis method, but no advantage is taken of any supposed knowledge about future flows. (Snyder-California, Davis)
W75-08928

A STUDY TO EXPLORE THE USE OF ORBITAL REMOTE SENSING TO DETERMINE NATIVE ARID PLANT DISTRIBUTION,
Arizona Univ., Tuson. Office of Arid-Lands Studies.
For primary bibliographic entry see Field 7B.
W75-08945

ESTIMATION OF THE WATER RESOURCES OF A PORTION OF THE GAMBIER PLAIN SOUTH AUSTRALIA USING A NEW METHOD FOR EVALUATING LOCAL RECHARGE,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
For primary bibliographic entry see Field 2F.
W75-08953

INVESTIGATION OF SENSITIVITY AND ERROR PROPAGATION IN NUMERICAL MODELS OF GROUNDWATER BASINS,
James Cook Univ. of North Queensland, Townsville (Australia).
For primary bibliographic entry see Field 2F.
W75-08954

TECHNIQUES FOR HANDLING INPUT DATA FOR FINITE ELEMENT ANALYSIS OF REGIONAL GROUNDWATER FLOW,
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 2F.
W75-08955

VARIATIONS IN ESTIMATES OF DESIGN FLOODS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
A. J. Askew.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 26 - 30, May 1975. 3 fig, 2 tab, 6 ref.

Descriptors: *Design flood, *Design data, *Rational formula, *Unit hydrographs, Estimating, Peak discharge, Watersheds(Basins), Rainfall-runoff relationships, Design criteria, *Australia.

The derivation of a design flood requires that a series of decisions be made concerning the procedures to be used and the values to be accepted for critical parameters. The choices available for the use of the Rational and Unitgraph methods on ungauged catchments are reviewed in relation to the commonly-used Australian data sources. The effects of different choices on the floods derived for three hypothetical catchments of differing stream slope are investigated, and their nature and magnitude discussed. (CSIRO)
W75-08956

A NEW DEVELOPMENT IN FLOOD FREQUENCY ESTIMATION,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia).
For primary bibliographic entry see Field 2E.
W75-08957

COMPARISON OF UNIT HYDROGRAPH AND RUNOFF ROUTING METHODS OF FLOOD ESTIMATION,
Monash Univ., Clayton (Australia).
For primary bibliographic entry see Field 2E.
W75-08958

DEVELOPMENT OF REGIONAL FLOOD ESTIMATION PROCEDURES,
Cameron, McNamara and Partners, Brisbane (Australia).
I. G. Cameron, J. K. G. Ward, and J. L. Irish.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 41 - 45, May 1975. 6 fig, 1 tab, 4 ref.

Descriptors: *Flood forecasting, *Regional analysis, *Regional flood, Flood control, Planning, Regional development, Peak discharge, Flood frequency, Flood recurrence interval, Statistical methods, *Australia.
Identifiers: *Queensland(Australia).

Prediction of peak discharges and water levels at various return periods is of particular importance to the design of surface water control structures in Australia, where stream runoff is characterised by high ratios of extreme flows to median flows. A brief historical review of regional estimation procedures is presented, and the actual development of a system applied to three coastal areas in Queensland is described. The technique involves the definition of statistically homogeneous regions, the analysis of available streamflow data, and the development of curves applicable to all streams in the region. (CSIRO)
W75-08959

A FLOW AND SALT TRANSPORT SIMULATION SYSTEM FOR THE RIVER MURRAY IN SOUTH AUSTRALIA,
South Australia Engineering and Water Supply Dept., Adelaide.
For primary bibliographic entry see Field 7C.
W75-08960

CONTROLLED SUBSURFACE DRAINAGE FOR SOUTHERN COASTAL PLAINS SOIL,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-08972

EARTH-DAM SEEPAGE AND RELATED LAND WATER PROBLEMS,
Dames and Moore, Phoenix, Ariz.
C. Yost, Jr., and J. W. Naney.
Journal of Soil and Water Conservation, Vol 30, No 2, p 87-91, March-April 1975. 4 fig, 1 tab, 9 ref.

Descriptors: *Earth dams, *Seepage, *Damages, Water table, Valleys, River basins, Saline soils, Phreatophytes, Evaporation, Sedimentation, Channels, Clogging, Reservoir storage, Ditches, Water quality, Hardness(Water), Aquifers, *Oklahoma, Land use.
Identifiers: *Washita River Basin(Okla).

Field observations at and below earth dams in a 1130-square-mile area of the Washita River Basin revealed that disturbances of the natural equilibrium by dam construction can initiate at series of spontaneous events. Retardation of water by a dam may be followed by seepage, which can cause structural damage and increase the rate of seepage. The seepage subsequently may cause a shallow water table in the valley downstream, which, when subjected to evaporation, successively causes a loss of water and salination of soils. Phreatophytes, which grow in areas with a shallow water table may invade stream channels where they impede flow, collect debris, and cause sedimentation. This channel clogging may increase flooding and raise the water table, creating a cyclic condition. Basic solutions to these land- and water-use problems include (1) avoidance, (2) prevention, (3) remediation, and (4) adaptation. (Visocky-ISWS)
W75-08973

CIVIL ENGINEERING APPLICATIONS OF REMOTE SENSING,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 7B.
W75-08978

RBAD, RELATIVE BASAL AREA DETERMINATION, A FORTRAN PROGRAM TO DETERMINE BASAL AREA BY SPECIES AND PLOT FROM IBP STANDARD FORMAT FOREST SERVICE PLOT TAPES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7C.
W75-08990

UROS4: URBAN FLOOD SIMULATION MODEL PART 1. DOCUMENTATION AND USERS MANUAL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
A. M. Lumb.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 936, $7.50 in paper copy, $2.25 in microfiche. March 1975. 225 p, 30 fig, 48 tab, 17 ref.

Descriptors: Urban runoff, *Urban drainage, Hydrographs, *Georgia, *Urban hydrology, *Model studies, Flood control, *Simulation analysis, *Flood stages, Flood peak, Computer programs.
Identifiers: Runoff files, DeKalb County(Geo).

An Urban Flood Simulation Model was developed for use by DeKalb County, Georgia, in evaluating the hydrologic effects of tributary area land use, constricting culverts, detention storage, and channel conditions. The Model was formulated as a working tool for tributary land use planning, structural design, and flood plain management to deal with a widespread drainage problem along small urban creeks. Rainfall, streamflow, and soils data were analyzed with the Stanford Watershed Model to develop an historic data file of rainfall excess or runoff for the range of land surface conditions found in DeKalb County. The Urban Flood Simulation Model simulates 25 years of annual flood peaks given the data file and prescribed physical characteristics of as many as 100 area, channel, and storage segments in a selected drainage area. The model will calculate flood elevations and associated probabilities for specified points. Though collecting, coding, and checking the physical data may take a man-month, once the coding is complete it is relatively easy to explore the effects of changing land-use, altering the drainage system, or adding detention storage. The procedures used in developing the file of runoff data, selecting equations to incorporate within the model, the computer programming, and the recommended procedures for collecting and coding data on drainage characteristics are described in detail. The computer program is listed. (See also W75-09047) (James-Georgia Tech)
W75-09046

UROS4: URBAN FLOOD SIMULATION MODEL PART 2. APPLICATIONS TO SELECTED DEKALB COUNTY WATERSHEDS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
L. D. James, and A. M. Lumb.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 937, $7.50 in paper copy, $2.25 in microfiche. May 1975. 237 p, 37 fig, 106 tab.

Descriptors: *Georgia, Urban drainage, *Urban hydrology, *Urbanization, *Channelization, Detention storage, Culverts, Model studies, Flood control, *Simulation analysis.
Identifiers: DeKalb County(Geo).

The Urban Flood Simulation Model developed for use by DeKalb County, Georgia, to evaluate the hydrologic effects of tributary land use, constricting culverts, detention storage, and channel conditions was applied to eight watersheds within the county. For each watershed, the basic physical characteristics, the nature of the flooding problem, the data collected for flood hydrograph simulation, and the results of the studies are described. On one 1058-acre watershed, a number of simulation runs were used to study the effects of impervious tributary area and channel improvement on flood flows. These runs showed urbanization to multiply flood peaks by a factor of about three, channelization to multiply flood peaks by a factor that increased from 1.06 to 1.23 as drainage area increased from 1 to 1000 acres, and six different storms as critical in different parts of the watershed. The hydrologic analyses of the eight watersheds found that sites suitable for flood retardation dams generally were not effective except in very small watersheds, that existing culverts were causing sufficient ponding to significantly reduce downstream flooding, and that sediment and debris deposits were a major problem. The Model was very useful for quick estimation of the hydrologic effects of land use and channel changes and for estimating flood flows for various purposes. (See also W75-09046)
W75-09047

A LAND USE PROGRAM FOR ARIZONA.
Arizona Environmental Planning Commission, Phoenix.
For primary bibliographic entry see Field 6B.
W75-09058

OPTIMIZING PARAMETERS FOR A WATERSHED MODEL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2E.
W75-09077

BENEFITS AND LAND USE CHANGE CONNECTED WITH A FLOOD CONTROL PROJECT,
Dayton Univ., Ohio. Dept. of Economics.
D. B. Oyen, and J. R. Barnard.
Water Resources Bulletin, Vol 11, No 3, p 483-490, June 1975. 2 tab, 11 ref. OWRT A-038-IA(2).

Descriptors: *Water resources, *Projects, *Land use, *Estimating, Benefits, Regression analysis, Flood plains, Dams, Agriculture, Economics, Mathematical models, Systems analysis, Iowa.
Identifiers: *Iowa River, *Land use changes.

To insure that expenditures on water resources projects are justified, more accurate predictions of land use change are needed; this in turn requires more information on the factors that influence land use change. This study examines agricultural land use change in the flood plain of the Iowa River as a result of building the Coralville Dam. Estimates of land use change and the benefits realized from the project are compared to the original project study benefits estimated by the Corps of Engineers. An analysis of the factors affecting land use change is carried out through a regression model to determine those variables that explain observed land use change. It has been contended that net benefits from flood control projects are overstated because the anticipated land conversion does not take place, because of the low discount rate applied to the benefits stream of public projects, and because agricultural prices have been influenced by government programs to bolster farm prices. Results of the ex post evaluation of the actual agricultural benefits originating from the Coralville Dam indicate that actual benefits, even when adjusted downward to account for the above three factors, were one-third greater than the projected benefits from the original Corps of Engineers feasibility study. The biggest error in the Corps' projection of benefits came from underestimating yields. The probability of land use change increases with increases in the number of acres available for conversion, the age of the landowner, and the number of years of education of the landowner. (Bell-Cornell)
W75-09081

FLOOD PLAIN INFORMATION: SANTA CLARA RIVER AND SESPE CREEK, FILLMORE, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
Prepared for the County of Ventura, June 1972. 31 p, 21 fig, 23 plates, 6 tab.

Descriptors: *Floods, *Flood plains, *Flooding, *Flood profiles, Flow, *Flood forecasting, Flood data, Flood frequency, *California.

Identifiers: Santa Clara River(Calif), Sespe Creek(Calif), Fillmore(Calif), Ventura County(Calif), Intermediate Regional Flood, Standard Project Flood.

Ninety percent of the watershed of the Santa Clara River which begins in the San Gabriel mountains consists of high rugged mountains; the remainder, valley floor and coastal plain. In the study reach where the average gradient is 24.4 ft/mi, the river is a wide, sandy watercourse with a floodplain about 1 mile wide, containing citrus orchards, about 80 structures, the Fillmore sewage disposal plant, the California State fish hatchery, and a mobile home park. Construction of a proposed freeway on the north side of the river may stimulate development. Erosion of river banks during large floods with formation of sand bars has had a significant effect in changing the river's channel cross section. The Santa Clara River had a peak discharge of 68,000 cfs at the Ventura-Los Angeles County line in the record flood of January, 1969. Sespe Creek, with a study reach gradient of 40 ft/mi, joins it near Fillmore, California, about 15 miles downstream, it crested at 60,000 cfs. This flood was followed by another damaging flood a month later which again washed out roads, bridges, and orchards. An Intermediate Regional Flood (IRF) would have peak discharges of 165,000 cfs on the Santa Clara River at the downstream limit of the study and 85,000 cfs on Sespe Creek at the confluence with the Santa Clara River. A Standard Project Flood (SPF) would have discharges at those points of 250,000 cfs and 109,000 cfs. Severe damages would be sustained by orchards, commercial establishments, and residential sections, and related streets and utilities. Stream velocities would erode banks in the channel and cause hazardous overbank flooding. High velocities could also cause damage due to transportation of debris, which, when deposited, forms a barrier that intensifies lateral flooding. (Park-North Carolina)
W75-09084

SPECIAL FLOOD HAZARD INFORMATION REPORT: ATLANTA, GEORGIA, INCLUDING PEACHTREE CREEK BASIN IN DEKALB COUNTY.
Army Engineer District, Mobile, Ala.
Prepared for Atlanta Region Metropolitan Planning Commission, October 1971. 16 p, 2 fig, 35 plates, 3 tab.

Descriptors: *Floods, *Flooding, *Flood control, *Flood protection, *Flood plains, *Control structures, *Georgia, Flood plain zoning, Warning systems, Flood forecasting.
Identifiers: Atlanta(Geo), Peachtree Creek Basin(Geo), DeKalb County(Geo), Fulton County(Geo), Intermediate Regional Flood, Greater Probable Flood, Standard Project Flood.

Twenty-one streams and tributaries contribute to the floodplain area of Atlanta which is hilly with relatively steep streams with elevations ranging from 750 to 1,100 ft above mean sea level. This report covers 85 1/2 stream miles. The watersheds of all streams lie within Fulton County with the exception of the Peachtree Creek basin which extends into Gwinnett and Dekalb Counties. Data on each stream include length, width, and height of channel and the average slope; individual plates show extent of flooding in an Intermediate Regional Flood (IRF) and Greater Probable Flood (GPF). A floodplain management program in Atlanta can be based on data collected in seven preceding floodplain information reports and in this report. Past floods have caused damages to floodplain development. Increased urbanization demands further land development which could restrict the flow of water and increase flood heights and damages upstream. Profiles give specific stream peak elevations for an IRF and GPF which mark the limits of the flood. Corrective measures such as flood proofing, construction regulations for floodplains, land filling, and land use regulations, could be implemented to increase flood protection in the Atlanta Area. (Salzman-North Carolina)
W75-09085

FLOOD PLAIN INFORMATION: EAST FORK BIG WOOD RIVER, GIMLET TRIUMPH, IDAHO.
Army Engineer District, Walla Walla, Wash.
Prepared for Blaine County, Idaho, November 1973. 18 p, 4 fig, 13 plates, 2 tab.

Descriptors: *Floods, *Flood plain zoning, *Idaho, Flooding, Flood control, Flood protection, Flood plains, Flood frequency, Flood plain insurance, Flood profiles.
Identifiers: *East Fork Big Wood River(Ida), Gimlet(Ida), Triumph(Ida), Intermediate Regional Flood, Standard Project Flood.

East Fork, a tributary of Big Wood River, drains an area of 81 square miles in South Central Idaho east of Ketchum. The East Fork channel slopes through steep mountainous terrain at 74 feet per mile, varies in width from about 30 to 70 feet and has a maximum depth of about 5 feet. The floodplain has little development, but pressure from the resort industry in nearby Ketchum will probably spur future development. East Fork has no streamflow records but its flooding parallels the flooding on Warm Springs Creek to the east and Big Wood River to the South. Flood flows above bankfull occur on the average every 3 to 4 years. Flood season is from late April to early June resulting from melting of snowpack. Winter rain plus snowmelt floods also can occur. Natural and manmade obstructions including 2 bridges restrict flood flow. Blaine County has enacted a floodplain zoning ordinance, and is eligible for federal flood insurance. Either an Intermediate Regional Flood or a Standard Project Flood could result from a combination of rainfall and snowmelt causing a 3.5 foot rise or a 7.0 foot rise respectively in the East Fork Big Wood River and inundating the floodplain for up to 3 weeks. (Salzman-North Carolina)
W75-09086

FLOOD PLAIN INFORMATION: PORTNEUF RIVER, INKOM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
Prepared for the Bannock County Board of Commissioners, April 1974. 30 p, 10 fig, 11 plates, 3 tab.

Descriptors: *Flood plains, *Flood, *Flooding, Flood control, Flood protection, Historic floods, *Idaho.
Identifiers: *Portneuf River(Ida), Inkom(Ida), Standard Project Flood(SPF), Intermediate Regional Flood(IRF).

Inkom, a railroad transport town, has numerous industries surrounded by agricultural land. The Portneuf River Basin, a semi-arid area which includes Inkom and several other towns, is formed by the 97 mile long river emptying into the Snake River. Its slope ranges from 37 ft/mi in the upper reaches to 4 ft/mi in the Inkom area. Residential and commercial developments in Inkom as well as railroad tracks running parallel to the stream are in the floodplain. A stream gage at Pocatello, downstream from Inkom, has recorded data since 1912. The greatest flood, on February 14, 1962, crested at 11.3 feet where an overbank flood height is 7 feet and had peak discharge of 2,990 cfs. Damages were estimated at $3 million. Major floods occur during winter and spring resulting from rainfall runoff combined with snowmelt. Winter rainstorm flooding above bankfull lasts for several days. Spring snowmelt floods rise slowly and last much longer up to several weeks. Natural and manmade obstructions including 7 bridges restrict flood flow. No flood ordinances exist. Extreme combinations of rainfall and snowmelt could result in the severe flooding of an Intermediate Regional Flood (IRF) or Standard Project Flood (SPF) with respective discharges of 11,000 cfs and 5,500 cfs. (Salzman-North Carolina)
W75-09087

FLOOD PLAIN INFORMATION: OROFINO CREEK-WHISKEY CREEK, OROFINO, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
Prepared for the City of Orofino, Idaho, October 1972. 28 p, 10 fig, 12 plates, 3 tab.

Descriptors: *Flood, *Flooding, *Flood plains, Flood control, Flood protection, *Idaho, Flood forecasting, Flood profiles.
Identifiers: Orofino Creek(Ida), Whiskey Creek(Ida), Orofino(Ida), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Orofino Creek, a major tributary of the Clearwater River, rises in the Sheep Mountain Range in the Clearwater National Forest of Idaho. The stream slopes at an average of 72 ft/mi and average width is 91 feet and depth is 8.7 feet with a total drainage area of 235.7 square miles. Whiskey Creek, a tributary of Orofino Creek, slopes at an average of 206 ft/mi and average width is 46 feet and depth is 7.6 feet. Development on the narrow floodplain consists of residential and commercial property. Nearby Dworshak Dam and Lake may lead to greater development. Moderate to high stream flows occur during the winter and peak flows develop between March and June resulting from combined rainstorms and snowmelt. No permanent structural flood protection works exist within the study reaches of the streams. The largest flooding on Orofino Creek occurred in May 1957 with a peak discharge of 7300 cfs. The most recent flood in January 1965 had a discharge of 3000 cfs. Whiskey Creek experienced flooding at the same times. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would result in extensive damage. Peak discharges of an IRF and SPF would be 7600 cfs and 12,000 cfs, respectively. (Salzman-North Carolina)
W75-09088

SPECIAL FLOOD HAZARD INFORMATION: SOUTH FORK PALOUSE RIVER, MOSCOW, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
Prepared for Latah County, Idaho, January 1973. 8 p, 5 fig, 10 plates, 1 tab.

Descriptors: *Floods, *Flooding, *Flood plains, Flood control, Flood protection, Historic floods, *Idaho, River forecasting, Peak discharge, Flood stages.
Identifiers: *South Fork Palouse River(Ida), Moscow(Ida).

Moscow, in Latah County in Western Idaho, is inundated by flooding of a 6-mile reach of the South Fork Palouse River which extends from the Idaho-Washington stateline upstream to a point east of Moscow. The river, sloping at an average of 14 feet per mile, flows through rural areas and has a channel width of 36 feet and an average depth of 7.6 feet. Natural and manmade obstructions including 12 bridges and culverts restrict the flood flow. Floods are of short duration and flood stages rise and fall rapidly. Velocity of overbank flow of the river would average one to five feet per second causing erosion and deposition of debris and silt. Little information exists on past floods because little damage to property occurred in the rural area and damage in Moscow was superceded by the flooding of a northern stream, Paradise Creek. The most recent flood occurred on January 21, 1972 causing culverts to be washed out and flooding roads and lowlands. Peak discharges for an Intermediate Regional Flood and a Standard Project Flood were estimated at 2100 cfs and 3300 cfs, respectively. (Salzman-North Carolina)
W75-09089

FLOOD PLAIN INFORMATION: THREE MILE CREEK, LEAVENWORTH, KANSAS.
Army Engineer District, Kansas City, Kans.
Prepared for the City of Leavenworth, Kansas, and Kansas Water Resources Board. December 1970. 33 p, 12 fig, 15 plates, 4 tab.

Descriptors: *Floods, *Flood control, *Flood plains, *Kansas, Flooding, Flood protection, Levees, Channel improvement.
Identifiers: Three Mile Creek(Kan), Leavenworth(Kan), Intermediate Regional Flood, Standard Project Flood.

Three Mile Creek, a tributary of the Missouri River, drains 6.4 square miles, 70% of which is within the city limits of Leavenworth, Kansas. Downstream the creek slopes about 21 ft/mi with channel width averaging 40 feet in a 1000-foot floodplain. Upstream the creek slopes about 29 ft/mi, the channel width averages 20 to 30 feet, and the floodplain, about 300 feet wide, includes several small farm ponds. Present development ranges from agricultural at its headwaters to residential, commercial and light industrial becoming more intense toward the urban core. Flooding may occur during any season as a result of extreme weather changes. Summer precipitation also includes local thunderstorms of high intensity and short duration. Obstructions to flood flow include 18 bridges spanning the creek. Flood damage prevention measures include minor channel modifications, bank stabilization, and one small levee. Since no stream gaging station exists, all data were obtained from historical documents. The greatest known flood occurred July 6, 1904 with an estimated peak discharge of 7,000 cfs. The most recent flood was April 27, 1969. Projected peak discharges for an Intermediate Regional Flood and Standard Project Flood at the mouth of the creek are 7500 cfs and 12,700 cfs respectively. Both would cause severe flooding in the developed areas of the floodplain. (Salzman-North Carolina)
W75-09090

FLOOD PLAIN INFORMATION--MECHUMS RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for Albemarle County Board of Supervisors and Bureau of Water Resources, State Water Control Board Richmond, Virginia, February, 1973. 31 p, 6 fig, 15 plates, 12 tab, glossary.

Descriptors: *Maximum probable flood, *Flood data, *Flood peak, *Floods, Overland flow, Nonstructural alternatives, Flood control, Flood flow, Flooding, Flood profiles, Floodplain zoning, Flood forecasting, Hurricanes, *Virginia.
Identifiers: Intermediate Regional Flood, Standard project flood, *Mechums River(Va), Albemarle County(Va).

The Mechums River, in rural Albemarle County, Virginia, drains 99 square miles. It merges with Moormans River to form the South Fork of Rivanna River 18 miles upstream from Charlottesville, Virginia. Largely undeveloped, this area will come under increasing pressures for urbanization as Charlottesville expands. Stream gaging records at Ivy, Virginia, interviews, high water marks, and studies in the Rivanna Basin show that hurricanes have flooded the Mechums generally from May to November. Seven bridges span the river and would cause some backup of water during a flood as well asn an obstruction to floating debris. Flood maps and cross sections are presented to assist in future bridge design. The record flood on the Mechums was in October, 1933, with a gage reading of 33 feet, 23 feet above bankfull stage. During this storm 18.9 inches of rain fell in the region, and the flood was comparable to an Intermediate Regional Flood. The storm of August, 1969, dropped 21 inches of rain 15 miles south of Charlottesville, which would have produced very severe flooding had it centered over the Mechums River basin. The maximum probable flood (Standard Project Flood) would reach a stage of 40.6 inches with a hazardous overbank velocity of 5 feet per second. To avoid damage, this report should be used as a basis for floodplain management ordinances, floodproofing of endangered structures, and delineation of an area for warning and evacuation procedures. Structural solutions are not recommended. (Herr-North Carolina)
W75-09091

FLOOD PLAIN INFORMATION: DEEP RIVER, TURKEY CREEK, DUCK CREEK, LAKE COUNTY, INDIANA.
Army Engineer District, Chicago, Ill.
Prepared for the Lake-Porter County Regional Transportation and Planning Commission, March 1973. 37 p, 12 fig, 25 plates, 8 tab.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood plain zoning, Flood control, Flood protection, Historic floods, *Indiana, Flood forecasting, Flood profiles.
Identifiers: *Deep River(Ind), Turkey Creek(Ind), Duck Creek(Ind), Lake County(Ind), Intermediate Regional Flood, Standard Project Flood.

Deep River drains 138 square miles of Lake County in northwest Indiana. Turkey and Duck Creeks, tributaries of Deep River, have slopes of 3.20 feet per mile and 6.70 feet per mile respectively. Deep River, including an artificial lake created by construction of Hobart Dam, slopes at an average of 3.75 feet per mile. Cities of Hobart, Crown Point and Merrillville mark the land development on the floodplain and are surrounded by residential and agricultural land. Pressure for development of floodplain land stems from intense urbanization of Gary. Floods occur during all seasons and can rise to extreme flood peaks in a relatively short period of time. The streams are spanned by 51 bridges and culverts which increase flood flow restrictions. Hobart Dam has little flood control capacity and no flood reduction projects exist. Under state law, any floodway construction must be approved. The largest flood occurred on October 11, 1954, cresting at 606.61 feet mean sea level datum (msld). The most recent flood, in May 15, 1970, crested at 603.57 feet msld and caused significant property damage due to the increased development in the floodplain. Both an Intermediate Regional Flood and a Standard Project Flood would result in inundation of agricultural, residential, commercial, and industrial sites cresting at 610.6 feet msld and 621 feet msld respectively. (Salzman-North Carolina)
W75-09092

POLICY ALTERNATIVES IN FLOOD PLAINS.
East Central Florida Regional Planning Council, Winter Park.
For primary bibliographic entry see Field 6F.
W75-09094

FLOOD PLAIN INFORMATION: SANTA ANA RIVER (IMPERIAL HIGHWAY TO PRADO DAM), ORANGE AND RIVERSIDE COUNTIES, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
Prepared for Orange County Flood Control District, June, 1971. 35 p, 27 fig, 13 plates, 6 tab.

Descriptors: *Floods, *Flooding, *Flood plains, Flow, Flood frequency, Flood recurrence interval, Flood profile, *California.
Identifiers: *Santa Ana River(Calif), Orange County(Calif), Riverside County(Calif), Intermediate Regional Flood, Standard Project Flood, Prado Dam(Calif).

The 10.84-mile reach of the Santa Ana River from Prado Dam to the Imperial Highway is analyzed for flood history and potential. Existing development is primarily agricultural, using the river for irrigation of citrus groves, but residential pressures from the City of Anaheim are increasing floodplain development of both a residential and transportation nature. Gage records have been kept for a number of years and the major flood record was in March, 1938, which had a peak discharge of 100,000 cubic feet/second (cfs) below Prado Dam. November to April is the major flood season. Obstructions to flow, both natural and manmade, increase flood damages causing backwater flooding and eorsion. A flood in February, 1969, had a discharge of only 5,000 cfs due to Prado Dam but damage was still extensive. Prado Dam is the only flood control facility but the two possible future floods would exceed the basin storage capacity of 198,200 acre-feet. These floods, the Intermediate Regional Flood (IRF) and the Standard Project Flood (SPF), would have flows of 48,000 and 150,000 cfs, respectively, and velocities exceeding 20 feet/second in canyon sections capable of severe erosion and movement of material up to large boulder size. (Park-North Carolina)
W75-09096

FLOOD PLAIN INFORMATION--COASTAL FLOODING, PORTSMOUTH, VIRGINIA.
Army Engineer District, Norfolk, Va.
51 p, 14 fig, 14 plates, 2 tab, glossary.

Descriptors: *Tidal waters, *Floods, *Flood waves, *Flood control, *Sea walls, Evacuation, Flood damage, Flood frequency, Flood peak, Flood protection, Flooding, *Virginia.
Identifiers: Standard Project Tidal Flood, Intermediate Regional Tidal Flood, Portsmouth(Va), *Elizabeth River(Va).

Portsmouth, Virginia, stands at the confluence of the James and Elizabeth Rivers. Bounded on the east by the Elizabeth River and on the north by the waters of Hampton Roads and penetrated by several tidal estuaries, it is subject to frequent serious tidal flooding of residential as well as commercial and industrial property. Tidal gage records as well as newspaper records indicate that severe flooding often accompanies autumn hurricanes, usually lasting for one tide cycle. Hydrological and meteorological data show that Portsmouth averages one hurricane per year, with a more serious storm averaging every ten years. Portsmouth also experiences winter and spring northeasters, powerful winds and heavy rains that have caused widespread flooding and damage, intensified by their long duration and wind-driven waves. In August, 1933, a hurricane flooded Portsmouth to a depth of 8 feet above mean sea level, and the northeaster in March, 1962, flooded to 7.4 feet, causing $1.4 million damages in 5 days of flooding. Studies show that even deeper floods are possible: an Intermediate Regional Tidal Flood (100-year flood) would crest at 8.5 feet, a Standard Project Tidal Flood would crest at 13.0 feet. Since this represents the reasonable upper limit of flooding, it should be used for regulations, evacuation plans, and floodplain management. The 1800-foot Crawford Redevelopment Project sea wall should be extended to connect with high ground. (Herr-North Carolina)
W75-09097

FLOOD PLAIN INFORMATION: TOMS RIVER, UNION BRANCH, RIDGEWAY BRANCH AND LONG SWAMP CREEK, OCEAN COUNTY, NEW JERSEY,
Army Engineer District, Philadelphia, Pa.
Prepared for the Ocean County Planning Board, June, 1972. 26 p, 10 fig, 19 plates, 19 tab.

Descriptors: *Flood plains, *Flood damage, *Flood plain zoning, Planning, Land use, Historic floods, Obstruction to flow, Flood discharge, Flood data, Floodways, Urbanization, *New Jersey, Marshes, Hurricanes.
Identifiers: *Toms River(NJ), Union Branch(NJ), Ridgeway Branch(NJ), Long Swamp Creek(NJ), Ocean County(NJ), *Flood plain management, Floodway Design Flood, Flood Hazard Area Design Flood, Standard Project Flood, Fluvial flooding, Tidal flooding, Barnegat Bay.

The portion of Ocean County covered by this report is subject to flooding from Toms River and its 3 tributaries. Properties along these streams are primarily residential and commercial. Continued industrial and commercial activity and subsequent increase in population will probably occure in the area, intensifying development in the floodplain. Because of the flat gradient and low relief of surrounding land, Toms River and its tributaries have formed a broad, poorly-drained floodplain with abundant swamp and marshland. Floods resulting from tropical hurricanes comprise the majority of the most severe floods and usually occur in the late summer and fall. The area is also subject to flooding from northwestern storms occurring throughout the year, to fluvial flooding from Toms River, and to tidal flooding from Barnegat Bay. Floods generally rise slowly and stay out of the banks for long periods. The largest stage of record for Toms River was estimated at 12.50 feet and 2000 cfs from a flood mark set in September 1938, but the actual gage reading was not available. Four of the 5 highest flows occurred within the last 3 years. Future floods discussed are Floodway Design Flood (FDF), Flood Hazard Area Design Flood (FHADF), and Standard Project Flood (SPF). At the gage on river mile 8.8, the peak flows for these floods would be 2800 cfs, 3600 cfs and 10,500 cfs, respectively. Of the 45 bridges and culverts crossing the streams in the study area, most of them are obstructive to FDG and FHADF and even more are obstructive to SPF. Floatable materials and small craft may cause additional hazards to life and property. (Diefendorf-North Carolina)
W75-09098

FLOOD PLAIN INFORMATION: POMPESTON CREEK BURLINGTON COUNTY, NEW JERSEY.
Army Engineer District, Philadelphia, Pa.
Prepared for Burlington County Planning Board and New Jersey Department of Environmental Protection, June 1971. 33 p, 6 fig, 11 plates, 3 tab.

Descriptors: *Flood plains, *Flood control, *Urbanization, Planning, Land use, Flood data, Flood stages, Obstruction to flow, *New Jersey, Delaware River.
Identifiers: Pompeston Creek(NJ), Burlington County(NJ), Flood plain management, Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Encroachment law, Tidal flooding, Fluvial flooding.

Pompeston Creek and its major and minor tributaries are discussed. The surrounding area is part of a large commercial and industrial complex which is affected greatly by improvements in Delaware River Port facilities. There has been extensive development in the relatively narrow floodplain, which has increased the flooding potential by altering stream runoff characteristics. Three types of floods occur in this area: tidal flooding from high tides on the Delaware River, fluvial flooding due to storms of high intensity, and flooding from inadequate drainage due to urbanization. Summer and fall are the main flood seasons. The greatest flood occurred in August 1933 resulting from tidal flooding on the Delaware River. Stages of 8.8 feet, m.s.l.d. were recorded at the mouth of Pompeston Creek. An Intermediate Regional Flood (IRF) would reach a height of 1.6 feet above the 1933 flood, and a Standard Project Flood (SPF) would reach 5 feet above an IRF. There are 2 dams with no flood control capacity and 23 crossings which may cause obstruction to flow. At present, there are no gaging stations, no floodplain regulations, and no existing, authorized or proposed control measures. However, New Jersey does have an Encroachment Law which is essentially a preventive flood loss measure. (Diefendorf-North Carolina)
W75-09099

FLOOD PLAIN INFORMATION: ANIMAS RIVER AND TRIBUTARIES, DURANGO, COLORADO.
Army Engineer District, Sacramento, Calif.
Prepared for the Animas Regional Planning Commission, La Plata County, and the City of Durango, Colorado, June, 1974. 43 p, 20 fig, 29 plates, 8 tab.

Descriptors: *Flooding, *Flood plains, *Flood profiles, *Floods, *Flood data, Flood frequency, *Colorado, Flood recurrence interval, Gages, Rivers, Tributaries.
Identifiers: *Animas River(Colo), Durango(Colo), La Plata County(Colo), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Portions of Durango, Colorado, and adjoining lands covered in this report are subject to flooding from the Animas River and Lightner, Junction, and Dry Gulch Creeks. The study area consists of 24% urban land uses, 47% agricultural use or vacant, and 29% public facilities and rights of way, with additional urbanization projected. Floods have occurred on an average of once every 3 years. A major flood occurred in October, 1911 on the Animas River (25,000 cfs discharge) and as recently as June, 1973 (7,590 cfs discharge). Future floods projected include the Intermediate Regional Flood (IRF) with an estimated discharge of 28,500 cfs at the Durango gage of the Animas River and the Standard Project flood (SPF) with a discharge of 42,000 cfs at the gage. The area inundated would include 1270 acres of agricultural or open land and 330 acres of urban land in an IRF. An SPF would not cover appreciably more land but the velocity of flow could be more hazardous than the estimated 13 ft/sec channel velocity on the Animas River for an IRF. Two reservoir sites and a channel modification project have been proposed but found uneconomical at this time. Non-structural alternatives are urged. (Park-North Carolina)
W75-09100

FLOOD PLAIN INFORMATION: VICINITY OF AUSTELL, GEORGIA, SWEETWATER CREEK.
Army Engineer District, Mobile, Ala.
Prepared for Atlanta Regional Commission, Janurary 1972. 19 p, 4 fig, 13 plates, 9 tab.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood plain zoning, Historic floods, Flood control, Flood protection, *Georgia.
Identifiers: Austell(Ga), Sweetwater Creek(Ga), Cobb County(Ga), Intermediate Regional Flood, Standard Project Flood.

Sweetwater Creek, a 40-mile-long tributary of the Chattahoochee River, is located northwest of Atlanta, Georgia. The upper reach is characterized by numerous waterfalls and rapids and agricultural uses on the floodplain. For a 7-mile reach in the vicinity of Austell the floodplain is about 1,000 to 3,000 feet wide. Development there includes residential, commercial and industrial property. Below Austell, the floodplain is narrow and wooded. Data from a staff gage installed in 1904 were supplemented by interviews, newspaper files and historical records. Floods are most numerous in winter and spring, caused by extensive frontal type storms lasting 2 to 4 days. Natural and manmade obstructions including bridges and their approach fills restrict flood flow. Flood control includes zoning ordinances which require structures located in the floodplain to be elevated. Greatest flooding occurred July, 1916, resulting from a tropical storm. The latest flood, in February 1961, with a discharge of 10,100 cfs, caused severe property damages. Both an Intermediate Regional Flood (IRF) and a Standard Project Flood (SPF) would cause severe damage with estimated peak discharges of 15,340 cfs 31,260 cfs, respectively. (Salzman-North Carolina)
W75-09101

FLOOD PLAIN INFORMATION: WARM SPRINGS CREEK, KETCHUM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
Prepared for Blaine County Board of Commissioners, October, 1972. 25 p, 7 fig, 21 plates, 4 tab.

Descriptors: *Floods, *Flooding, *Flood plains, Flood control, Flood protection, Levees, Historic floods, *Idaho.
Identifiers: Warm Springs Creek(Ida), Ketchum(Ida), Standard Project Flood, Intermediate Regional Flood.

Warm Springs Creek, a tributary of Big Wood River, drains an area of 99 square miles of steep mountainous terrain west of Ketchum, Idaho. The stream slopes at an average of 47 feet per mile, varies in width from about 35 to 140 feet, and has a maximum depth of about 8 feet. Little development exists upstream from Ketchum but recreational and residential development increases in the Ketchum area, the site of Sun Valley. Stream gage records were maintained from 1940 to 1958. Flood season occurs from late April to early June resulting from melting snowpack. Flood waters rise rapidly and are restricted by natural and manmade obstructions. Existing flood damage reduction measures are limited to local removal of debris, channel improvements, and levees built as emergency measures. Most are temporary improvements and not adequate to protect against severe flooding. The greatest recorded flood occurred in May 1958 when the creek had a peak discharge of 961 cfs and was 1.2 feet above bankfull. An Intermediate Regional Flood and a Standard Project Flood would be even greater with peak discharges of 1,250 cfs and 1690 cfs, respectively. Maps and cross sections showing extent of these floods are included. (Salzman-North Carolina)
W75-09102

FLOOD PLAIN INFORMATION: LOYALSOCK CREEK, LYCOMING COUNTY, PENNSYLVANIA.
Army Engineer District, Baltimore, Md.
Prepared for Lycoming County Planning Commission, June 1970. 35 p, 2 fig, 31 tab, 16 plates.

Descriptors: *Flood plains, *Flood damage, *Land use, *Planning, Flood profiles, Flood data, Flood stages, Obstruction to flow, Historic floods, *Pennsylvania.
Identifiers: *Loyalsock Creek(Penn), Lycoming County(Penn), West Branch Susquehanna River, Montoursville(Penn), East Mill Creek(Penn), West Mill Creek(Penn), Wallis Run(Penn), Flood plain management, Intermediate Regional Flood, Standard Project Flood.

This report covers Loyalsock Creek from its junction with West Branch Susquehanna River at Montoursville, Pennsylvania, upstream for 10.84 miles. Within the study reach the main tributaries are East Mill Creek, West Mill Creek and Wallis Run. The Loyalsock Creek floodplain is fairly uniform throughout the study reach, averaging about 2000 to 3000 feet wide. Although relatively undeveloped, most of the residential, commercial and industrial development along the creek lies in the floodplain. There are 3 bridges, one of which offers some obstruction to flood flow. The main flood season is in late winter and late fall, with the largest number of floods of major size occurring in March. The floods rise extremely rapidly and have a relatively short duration. The largest floods, recorded at the gaging station in Loyalsocksville, occurred in November 1926 and November 1950, each producing 51,200 cfs. An Intermediate Regional Flood (IoRF) would be about 1 to 5 feet higher than the November 1950 flood, with a peak discharge of 75,900 cfs and channel velocity of 22 feet per second. Cresting at 130,000 cfs, a Standard Project Flood (SPF) would be about 10 feet higher than an IRF. Both types of future floods would cause considerable damage. (Diefendorf-North Carolina)
W75-09104

ROCK VALLEY METROPOLITAN COUNCIL REGIONAL DEVELOPMENT GUIDE.
Rock Valley Metropolitan Council, Rockford, Ill.
For primary bibliographic entry see Field 6B.
W75-09106

FLOOD PLAIN INFORMATION, PIGEON RIVER, CLINTONVILLE, WISCONSIN.
Army Engineer District, Chicago, Ill.
Prepared for the City of Clintonville, Wisconsin, March, 1971, 44 p, 6 tab, 11 plates, 18 fig.

Descriptors: *Flood plains, *Flood plain zoning, *Flood damage, *Land use, *Flood profiles, Planning, Flood stages, Historic floods, Obstruction to flow, Dams, Reservoirs, Recreation, *Wisconsin.
Identifiers: *Pigeon River(Wis), *Pigeon Lake(Wis), *Clintonville(Wis), Flood plain management, Standard Project Flood, Intermediate Regional Flood.

Development on Pigeon River's broad flood plain is mainly recreational, commercial, and industrial. Two dams and reservoirs are operated to control the elevation of Pigeon Lake for recreational purposes. They are not flood control structures and therefore provide little protection against major floods. The largest flood, estimated to be of magnitude near an Intermediate Regional Flood (IRF), occurred in July, 1912. Since then, the most severe flood occurred in spring 1970. At the city of Clintonville, through which the river flows, discharge of the 1970 flood is estimated at 2500 cfs compared to the estimated peak discharge of 4000 cfs for an IRF and 25,000 cfs for a Standard Project Flood (SPF). An IRF would be from 0.4 to 5.2 feet higher than the flood of 1970. Flood stages of the SPF would be from 8.9 to 13.4 feet higher than the 1970 flood. The 5 bridges in the study reach would be overtopped by the SPF. (Diefendorf-North Carolina)
W75-09108

FLOOD PLAIN INFORMATION: TURKEY CREEK, METROPOLITAN KANSAS CITY.
Army Engineer District, Kansas City, Mo.
Prepared for Metropolitan Kansas City, January, 1974. 40 p, 29 fig, 24 plates, 4 tab.

Descriptors: Floods, *Flood plains, *Flood control, *Flood profiles, Flood protection, Flood data, Flooding, Flow, Obstructions to flow, Flood forecasting, *Kansas, *Missouri, Flood damage, Historic floods.
Identifiers: *Kansas City(Kan), Turkey Creek(Kansas), Merriam(Kansas), Overland Park(Kansas), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Past and potential flooding along 11 miles of Turkey Creek in Kansas City, Merriam, and Overland Park, Kansas, are examined. A further three-mile-long area below the 2000-ft diversion tunnel which links Turkey Creek to the Kansas River is also studied. Part of this area was the Turkey Creek channel prior to the tunnel construction in 1921, and all of it is still subject to flooding from either a Standard Project Flood (SPF) or an Intermediate Regional Flood (IRF), either of which would exceed the diversion tunnel's capacity. The greatest known flood had peak discharge of 13,650 cfs in June, 1938. Additional major floods occurred in 1914, 1958 and 1961. Damage has increased with each successive flood due to increased development of the floodplain, which is extensive and has intensified in recent years with completion of highway I-35 along the Turkey Creek flood plain. Part of the floodplain is the site of the Central Industrial District containing warehousing, administrative, and manufacturing facilities. All these uses would be in jeopardy from either an IRF or a SPF. Discharges would be 25,000 cfs at the diversion tunnel entrance for the IRF and 35,000 cfs for the SPF which would inundate over 1620 acres of the floodplain. Further hazards are presented by the high rate of rise and velocity of flood flow. (Park-North Carolina)
W75-09109

FLOOD PLAIN INFORMATION: BIG WOOD RIVER, BELLEVUE-HAILEY, IDAHO AND VICINITY.
Army Engineer District, Walla Walla, Wash.
Prepared for Blaine County, Idaho. June 1971 33 p, 8 fig, 20 plates, 2 tab.

Descriptors: *Floods, *Flooding, *Flood plains, Flood control, Flood protection, Levees, Historic floods, *Idaho, Flood forecasting, Snowmelt.
Identifiers: Bellevue(Ida), Hailey(Ida), *Big Wood River(Ida), Standard Project Flood, Intermediate Regional Flood.

During a flood the floodplain of Big Wood River in South Central Idaho would be inundated to depths that would greatly damage flood vulnerable facilities. The drainage area covers 741 square miles of steep mountainous terrain. Big Wood River slopes at approximately 36 ft/mi and varies in width from 60 to 360 feet. The resort at Sun Valley has caused increased residential and recreational development. Much of the floodplain is rural except for portions of Bellevue and Hailey. Flood season from snowmelt and rain is from late April to early June. Floods can last for a month or more. Man-made and natural obstructions impede flood flow. Flood damage prevention measures are limited to local removal of debris, channel improvements, and levees, which are inadequate to protect against severe flooding. Stream gages at Hailey and 10 miles southwest of Bellevue show that the largest known flood occurred on May 25, 1967 cresting at 5.59 feet, lasting 12 days. Both an Intermediate Regional Flood (IRF) and a Standard Project Flood (SPF) would cause inundation of a large part of the floodplain. They would be about 1.5 and 2.5 feet higher, respectively, than the flood of 1967. Floodway limits wide enough to convey the IRF with a maximum of 1 ft of backwater effect in rural areas and 0.5 ft backwater effect in urban areas are detailed on plates. (Salzman-North Carolina)
W75-09110

FLOOD PLAIN INFORMATION: LOWER SANTIAGO CREEK, ORANGE COUNTY, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
Prepared for Orange County Flood Control District, June 1973. 57 p, 49 fig, 27 plates, 5 tab.

Descriptors: *Floods, *Flood plains, *Flood profiles, *Flooding, *Flood damage, Maximum probable flood, Historic floods, Flood data, Flood forecasting, Flood frequency, *California, Erosion.
Identifiers: Orange County(Calif), Orange(Calif), Santa Ana(Calif), Lower Santiago Creek(Calif), Handy Creek(Calif), Intermediate Regional Flood, Standard Project Flood.

Flooding on the Santiago Creek with its fairly level floodplain and a major tributary, Handy Creek, can be caused by general winter storms, local thunderstorms, or intense general summer storms. Runoff in the basin is very eratic with long dry spells and intense runoff and flash flooding after excessive rainfall. Damages have occurred throughout the 9.4 mile study reach including the cities of Santa Ana and Orange with a combined population of 253,000, and agricultural lands within the county. Flood damage reduction projects include channel improvements, Villa Park Dam constructed in 1963, Santiago Reservoir constructed in 1933, and county floodplain zoning ordinance. The largest flood was probably in 1862 although the greatest flood damage was in 1969 involving over $3 million in physical damages, with severe damage due to lateral erosion to both the natural and improved channel. Most of these areas have been restored to pre-1969 conditions. Future floods could be larger; an Intermediate Regional Flood (IRF) would cover approximately 646 acres including 198 acres of built-up area and have an estimated peak discharge of 10,400 cfs, compared to the 6,000 cfs discharge in 1969. A Standard Project Flood utilizing a wider floodplain would crest at 17,000 cfs. Many bridges would be in danger, causing damming of flood waters and increasing flood depths. Velocities could reach 6-19 ft/sec. in the channel and 2-10 ft/sec. on the floodplain, making the creek capable of transporting large materials and causing substantial erosion. Structures along the creek banks would be in danger of both water damage and severe undercutting. (Park-North Carolina)
W75-09111

FLOOD PLAIN INFORMATION, MULBERRY CREEK, DRY CREEK, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Salina, Kansas, March 1972. 26 p, 8 fig, 13 plates, 4 tab.

Descriptors: *Flood plains, *Floods, *Flooding, *Flood control, Flood protection, Flood damage, Channel improvement, Diversion structures, Levees, *Kansas, Flood forecasting.
Identifiers: Mulberry Creek(Kan), Dry Creek(Kan), Salina(Kan), Intermediate Regional Flood, Standard Project Flood.

Characterized by a serpentine stream with a wide floodplain averaging 1.5 to 2 miles in width, Mulberry Creek drains an area of 271 square miles and slopes at an average of 3 ft/mi. Portions of the lower basin near Salina, Kansas, are becoming urbanized but most of the land is in agricultural use. Dry Creek flows into Mulberry Creek from the south along the western edge of Salina, and has a drainage area of 27 square miles not diverted to Smokey Hill River by Salina Flood Project. The remaining portion has been altered by the project and channel realignment. Most of the basin is agricultural with about 5 square miles used by airport and surrounding buildings. Flood season begins with spring rains and continues through early summer with generalized storms over the basin. Flows are characterized by high stages and high velocities. An effective flood damage prevention program has been initiated which includes channel improvement, diversion of Dry Creek to Smokey Hill River, channel straightening, and levee construction to protect the downtown part of Salina. New development of the floodplain encouraged by highways I-70 and I-35 will be vulnerable to even moderate floods. The most recent flood on May 22, 1971 discharged 7,800 cfs. An Intermediate Regional Flood and Standard Project Flood with peak discharges of 37,000 cfs and 54,000 cfs respectively could severely damage the Salina area. (Salzman-North Carolina)
W75-09112

FLOOD PLAIN INFORMATION: SMOKY HILL RIVER, SALINE RIVER, DRY CREEK DIVERSION, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Salina, Kansas, June 1972. 25 p, 7 fig, 4 tab, 21 plates.

Descriptors: *Floods, *Flood control, *Flood protection, *Flood plains, Flooding, Channel improvement, Levees, *Kansas, Diversion structure.
Identifiers: *Smoky Hill River(Kan), *Saline River(Kan), Dry Creek(Kan), Saline(Kan), Intermediate Regional Flood, Standard Project Flood.

Situated in wide valleys of well-developed agricultural lands, the Saline and Smoky Rivers drain a total area of 12,478 square miles of which 1,683 are uncontrolled by reservoirs. Width of channels average 90 ft and 100 to 200 ft on the Saline and Smoky Hill Rivers respectively in the city area. Floodplains vary from 2.5 to 3 miles. East of Saline (population 37,700) the two rivers share a common floodplain abnormally wide for a river of

this size. Dry Creek Diversion channel, created by the Salina Flood Protection Project along with 14 miles of levees and other channel improvements, is 2 miles long and about 120 feet wide and diverts Dry Creek into Smoky Hill River south of the city. Flood season begins with spring rains and continues through early summer. Flood flows are characterized by high stages, high velocities and long durations. Manmade encroachments obstruct flood flows. In Salina a planned flood damage program includes channel cutoffs, diversion channels and levees to be constructed along Smoky Hill River, Saline River and Dry Creek. The greatest flood on Smoky Hill River on May 29, 1903, had a peak discharge of 32,000 cfs and crested at 26.5 ft. The most recent flood, May 25, 1969, crested at 18.2 ft. An Intermediate Regional Flood and Standard Project Flood, with peak discharges of 32,000 cfs and 73,400 cfs respectively, would cause extensive inundation of the floodplain. A sewage disposal plant, a camp, and highway businesses are the only developments susceptible to flooding from an IRF due to the Salina Flood Protection Project. An SPF would cause much widespread flooding, overflowing the protective structures. (Salzman-North Carolina)
W75-09113

FLOOD PLAIN INFORMATION, KANSAS AND BIG BLUE RIVERS, MANHATTAN, KANSAS.
Army Engineer District, Kansas City, Kans.
Prepared for the City of Manhattan, Kansas, May 1972. 25 p, 8 fig, 12 plates, 4 tab.

Descriptors: *Flood data, *Flood control, *Flood plains, Floods, Flooding, Flood protection, Flood damage, Levees, Historic floods, *Kansas, Flood forecasting, Flood profiles.
Identifiers: *Kansas River(Kan), *Big Blue River(Kan), Manhattan(Kan), Standard Project Flood, Intermediate Regional Flood.

The Kansas River Basin drains an area of 45,465 square miles of which 39,929 square miles are controlled by reservoirs. Width of its floodplains vary from 5 to 3 miles. The river slope averages 2 feet per mile. Big Blue River, flowing southward east of the city of Manhattan, enters Kansas River 2 miles downstream from Manhattan. Although much of Manhattan's business district lies in the floodplain, the Central Business District is protected by a 1963 control project. Much of the floodplain land is agriculture slowly being replaced by mobile home parks. Major floods are caused by high intensity storms following a protracted period of general rains. With completion of Tuttle Creek Lake, part of a flood damage protection plan on Big Blue River, flooding in the eastern section of Manhattan will only be caused by backwater from the Kansas River. The flood of 1844 appears to have produced the maximum flood stage cresting at 40 feet on the Kansas River. An Intermediate Regional Flood would discharge 140,000 cfs on the Kansas River and 35,000 cfs on Big Blue River. For a Standard Project Flood, peak discharges would be 250,000 cfs for the Kansas River, 100,000 cfs for Big Blue River. Floodplain areas including commercial and residential land would be inundated by flood waters. (Salzman-North Carolina)
W75-09114

FLOOD PLAIN INFORMATION; TUCKAHOE CREEK, HENRICO COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 2E.
W75-09115

FLOOD PLAIN INFORMATION: PLUM CREEK, CUYAHOGA AND LORAIN COUNTIES, OHIO.
Army Engineer District, Buffalo, N.Y.
Prepared for Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section, June 1973. 32 p, 31 fig, 10 plates, 3 tab.

Descriptors: *Flood plains, *Flood damage, *Land use, *Planning, Flood stages, Flood profiles, Flood forecasting, Obstruction to flow, Floodplain utilization, *Ohio, Flood plain zoning.
Identifiers: *Plum Creek(Ohio), Cuyahoga County(Ohio), Lorain County(Ohio), Flood plain management, Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Columbia Township(Ohio).

The downstream 9.8 miles of Plum Creek in Cuyahoga and Lorain Counties, Ohio, are discussed. Major floods have occurred in late winter or early spring caused by melting snow coincident with moderate amounts of precipitation. Along Plum Creek a principal obstruction to flow is dense growth of brush and trees along the stream channel. Of the 33 bridges within the study reach, 4 would probably wash out during flood flow and the rest would obstruct flow. Widespread residential development on the floodplain would also be subject to damage. As there are no stream gaging stations, it was estimated that the thunderstorm rainfall in September 1972 resulted in a flood with a discharge of 2650 cfs. This flood, approximating a 100-year frequency discharge, resulted in contamination of the water supply and damage to homes. Along the reach, an Intermediate Regional Flood (IRF) would range from 1730 to 2760 cfs, and a Standard Project Flood (SPF) would range from 3070 to 7120 cfs. The elevation of a SPF outlined on maps is considered to be the upper limit of the floodplain and may be used to help develop land use regulations. Columbia Township adopted a floodplain zoning ordinance in December 1964 which restricts the use of floodplains to agricultural, park, and recreational facilities. (Diefendorf-North Carolina)
W75-09116

FLOOD PLAIN INFORMATION: NUECES RIVER AND TURKEY CREEK, CRYSTAL CITY, TEXAS.
Army Engineer District, Fort Worth, Tex.
Prepared for the City of Crystal City, June 1974. 34 p, 9 fig, 17 plates, 5 tab.

Descriptors: *Flood plains, *Flood damage, *Planning, *Land use, Flood data, Flood profiles, Floodplain zoning, Historic floods, Obstruction to flow, *Texas, Flood proofing.
Identifiers: *Nueces River(Tex), Turkey Creek(Tex), Crystal City(Tex), *Flood plain management, Intermediate Regional Flood, Standard Project Flood.

Information is provided on the flood hazard at the south Texas town of Crystal Creek posed by the Nueces River, Turkey Creek (a major tributary of the Neuces) and an unnamed creek. The area is sparsely developed with communities scattered throughout the upper watershed. Above the study area, the Nueces River is confined in a gorge. Where the study area begins, the gorge section changes rather abruptly into a wide valley section, and the stream channel decreases in size and capacity. There are 11 bridges which could cause obstruction to flow. Most flood-producing storms occur in spring and fall and are caused by heavy rain or intense thunderstorms. The storm in June 1935 produced the maximum flood of record on the Nueces River. At Uvalde, about 25 miles upstream, the peak discharge was 616,000 cfs. On the Nueces River with averaged maximum conditions, the peak discharge of an Intermediate Regional Flood (IRF) would be 274,000 cfs, and of a Standard Project Flood (SPF) 495,000 cfs. For both types of future floods, main channel velocity would be approximately 3 feet per second and flood waters would spread over much of the study area. (Diefendorf-North Carolina)
W75-09117

FLOOD PLAIN INFORMATION: SMITH CREEK - CLIFTON FORGE AND ALLEGHANY COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the City of Clifton Forge, January, 1971. 41 p, 9 fig, 7 tab, 9 plates.

Descriptors: *Flood forecasting, *Flood profiles, *Flood data, Floodways, Watershed management, Flood peak, *Flood plains, Flood protection, Flood recurrence interval, *Virginia, Flood flow, Floodwater, Warning systems, Flow duration, Flood damage, Floodproofing, Water levels, River forecasting, Maximum probable flood.
Identifiers: *Smith Creek(Va), Clifton Forge(Va), Alleghany County(Va), Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Gathright Dam(Va).

In Clifton Forge, Virginia, residential, public, and commercial development is concentrated on both sides of Smith Creek. While most development is on high ground above flood danger, there are properties in low-lying areas. Greatest flooding occurred in August, 1969, and in December, 1950. Intermediate Regional Floods (IRF) on Smith Creek would be from 2 to 7 feet higher than the 1969 flood, and Standard Project Floods (SPF) would be from 4 to 12 feet higher. Flood damage would be significant, especially with an SPF. Main flooding season for larger floods is during the summer and fall due to intense local thunderstorms and tropical disturbances. IRF velocities range from 13 feet per second in natural channels to 18 feet per second at restricted stream sections. During an SPF, channel velocities would range from 4 to 24 feet per second and up to 20 feet per second at restricted sections. Flood duration is short, lasting a few hours. No protection through flood plain regulations exists in Clifton Forge or Alleghany County, although Gathright Dam, when constructed, will reduce flood heights by 3 feet. A flood warning system for Smith Creek is not provided. (Grden-North Carolina)
W75-09118

FLOOD PLAIN INFORMATION: REPUBLICAN RIVER, FRANKLIN, NEBRASKA.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Franklin, Nebraska, March 1973. 25 p, 12 fig, 7 plates, 4 tab.

Descriptors: *Floods, *Flood protection, *Flood forecasting, Flooding, *Flood plains, Flood plain zoning, Flood control, *Nebraska.
Identifiers: *Republican River(Neb), Franklin(Neb), Harlan County Lake(Neb), Intermediate Regional Flood, Standard Project Flood.

Width of the flood plain fo the Republican River at Franklin, Nebraska, averages 1 1/2 miles. Since Harlan County Lake went into operation upstream, the total drainage runoff area is 440 square miles. Width of the channel averages 150 feet and it slopes about 4 feet per mile. Center, Ewing and Beauty Creeks, with a combined drainage area of 88 square miles, contribute to the flood-prone areas surrounding Franklin. Franklin flood plain areas have been left relatively free from encroachment through local zoning which restricts land to agricultural and other open space use. Flood season begins with spring rains and continues through early summer causing high river stages and floods of long duration. The short tributary creeks are characterized by flash flooding. On the river, bridges obstruct the flood flows. The creeks are overgrown with trees and brush. The greatest known flood in the upper Republican River Basin occurred in 1935 with a peak discharge of 260,000 cfs at Bloomington, Nebraska. Even with the completion of Harlan County Lake in 1952 flood hazards still exist. Estimated peak discharges for an Intermediate Regional Flood and Standard Project Flood on the Republican River at Franklin would be 34,000 cfs and 110,400 cfs respectively. Plates detail flood plain areas that would be inundated. (Salzman-North Carolina)
W75-09119

FLOOD PLAIN INFORMATION: MILL CREEK, NEW CASTLE COUNTY, DELAWARE.
Army Engineer District, Philadelphia, Pa.
Prepared for New Castle County Department of Planning, May 1973. 27 p, 10 fig, 19 tab, 11 plates.

Descriptors: *Flood plains, *Flood damage, *Planning, *Delaware, Flood data, Flood stages, Obstructions to flow, Historic floods, Hurricanes, Thunderstorms, Flood profiles.
Identifiers: *Mill Creek(Del), New Castle County(Del), White Clay Creek(Del), Delaware Park Race Track, Standard Project Flood, Intermediate Regional Flood, Floodplain management, Hockessin(Del).

Most of Mill Creek's floodplain is sparsely developed, although the gently rolling floodplain in the southern portion of the watershed is occupied by some development, including the Delaware Park Race Track. The study area covers Mill Creek from its confluence with White Clay Creek upstream 9.3 miles to its headwaters. Information on past floods is available from records of the gaging station at Hockessin which has been in operation since 1966. The greatest flood of record occurred in July 1969, reached 225.1 ft m.s.l. and had a peak discharge of 2100 cfs. An Intermediate Regional Flood (IRF) and a Standard Project Flood (SPF) would reach 226.8 and 227.0 ft. m.s.l. and would produce 2300 and 2500 cfs respectively. Both of these planning floods would inundate development in the area, causing considerable damage. Floods generally occur in July, August, and September--the season of hurricane and thunderstorm activity. They generally rise slowly and stay out of banks for long periods of time. There are natural and man-made obstructions to flow, including 27 bridges. The 2 dams within the study reach have no flood control capacity. (Diefendorf-North Carolina)
W75-09120

FLOOD PLAIN INFORMATION: ANTIETAM CREEK, WASHINGTON COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
Prepared for Washington County Planning and Zoning Commission, June 1972. 31 p, 2 fig, 14 plates, 8 tab.

Descriptors: *Flood plains, *Flood damage, *Flood profiles, Planning, Land use, Flood data, Historic floods, Obstruction to flow, *Maryland, Flood forecasting, Potomac River.
Identifiers: *Antietam Creek(Md), Washington County(Md), Hagerstown(Md), Intermediate Regional Flood, Standard Project Flood, Floodplain management, Little Antietam Creek(Md).

The watershed of Antietam Creek is long and narrow, ranging in width from 4 to 12 miles. The floodplain is also narrow, averaging 520 feet in width within the 36-mile study reach from Route 60 downstream to the Potomac River. The land adjacent to the stream is mostly wooded or agricultural. Urban development is concentrated in and around the city of Hagerstown, Md. Flood occur throughout the year, generally caused by heavy, basin-wide rains or intense thunderstorms, and are usually of short duration. Within the study reach there are 23 bridges, many of which would be overtopped by a Standard Project Flood (SPF). A July 1956 thunderstorm produced the largest recorded flood, 12,600 cfs at the gaging station, approximately the same size as an Intermediate Regional Flood (IRF). An IRF would have a peak discharge of 12,300 cfs and a channel velocity of 12 feet per second. An SPF would be 25 feet higher, producing a peak discharge of 63,000 cfs and a channel velocity of 18 feet per second. At present there are no flood control measures, although an ordinance restricts development in the floodplain. The 4 proposed headwater reservoirs on Little Antietam Creek will have no appreciable effect on flood flows on Antietam Creek. (Diefendorf-North Carolina)
W75-09121

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y.
M. K. Heiman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 015, $8.75 in paper copy, $2.25 in microfiche. M S Thesis, January 1975. 277 p, 2 fig, 4 tab, 199 ref. OWRT A-049-NY(1).

Descriptors: *Comprehensive planning, Administration, *Regional development, *Land management, City planning, Project planning, Coordination, State jurisdiction, Land classification, Rural areas, Environmental effects, *Land use, Parks, *New York, Evaluation.
Identifiers: *Adirondack Park(NY), Adirondack Park Agency(NY), State-local governmental cooperation.

In the late '60's, strong tourist, recreational, and second home development became increasingly significant in the Adirondack Park region of upstate New York. Land use controls were in part needed because shallow soils were unsuitable to cope with increasing waste disposal. The Adirondack Park Agency (APA) was formed to develop and administer regional land use planning for this six million acre park spread over twelve hilly-to-mountainous counties which includes the headwaters of five major drainage basins. Efforts of the APA to gain local compliance with state and regional development goals for the Adirondack Park are examined. National and other state land use planning efforts and the history of APA are summarized. The APA's land use regulations, some of the most stringent enacted by a state, are set forth, including shoreline development intensities, setback standards, and vegetation removal controls. The APA must approve local land use plans before they can be locally administered. Local governmental compliance and involvement are analyzed to determine the extent and type of local cooperation and what the APA should do to increase local acceptance of a regional perspective, a necessary component of the long-run protection of the Adirondack environment. (Herr-North Carolina)
W75-09122

MULTIOBJECTIVE WATER RESOURCES PLANNING, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-09123

ECOLOGICAL STUDIES OF TWO SWAMP WATERSHEDS IN NORTHEASTERN NORTH CAROLINA - A PRECHANNELIZATION STUDY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09130

VEGETATION OF SWAMPS RECEIVING REACTOR EFFLUENTS,
Savannah River Ecology Lab., Arken, S.C.
For primary bibliographic entry see Field 5C.
W75-09137

WATER IN THE GREAT BASIN REGION; IDAHO, NEVADA, UTAH, AND WYOMING,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-09170

DISCHARGE MEASUREMENTS AND CHEMICAL ANALYSES OF WATER IN NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 7C.
W75-09172

FLOODS IN EAST BATON ROUGE PARISH AND ADJACENT AREAS, LOUISIANA, FOR THE PERIOD 1953-74,
Geological Survey, Baton Rouge, La.
A. S. Lowe.
Water-Resources Investigations 44-74, March 1975. 12 p, 12 fig, 16 plate, 4 ref.

Descriptors: *Floods, *Maps, *Flood profiles, *Louisiana, Flood damage, Stage-discharge relations, Flood stages, Peak discharge, Flood frequency, Flood plain zoning, Flood recurrence interval, Flood control, Flood discharge, Economics, Planning.
Identifiers: East Baton Rouge Parish(La).

Flood damage resulting from development in flood plains in East Baton Rouge Parish. La., and adjacent areas has caused economic losses, making governmental officials and planners aware of the need for flood maps. Flood maps for 7 1/2-minute topographic quadrangles show the interpretative delineation of the highest flood elevation that occurred between the years 1953 and 1974. The flood boundaries were mapped on the following quadrangles: Port Hudson, Zachary, Fred, Pride, Pine Grove, Walls, Scotlandville, Comite, Watson, Baton Rouge West, Baton Rouge East, Denham Springs, Plaquemine, St. Gabriel, and Prairieville. The flood data provide a technical base on which responsible officials can make decisions for developing building and zoning regulations, locating waste-disposal facilities, developing recreational areas, and for evaluating the economic development of flood plains. (Woodard-USGS)
W75-09173

STREAMFLOW DEPLETION RESULTING FROM UPSTREAM SURFACE-WATER IMPOUNDMENT,
Geological Survey, Bay Saint Louis, Miss. Water Resources Div.
S. P. Sauer.
In: Proceedings of the Irrigation and Drainage Division Specialty Conference on Agricultural-Urban Considerations, held at Fort Collins, Colo, April 22-24, 1973: American Society of Civil Engineers, p 593-617, 1973. 8 fig, 3 tab, 16 ref.

Descriptors: *Reservoirs, *Diversion losses, *Water losses, *Texas, Mathematical models, Reservoir evaporation.
Identifiers: *Streamflow depletion.

A model was developed for use in evaluating site depletions to be expected from systems of small reservoirs similar to those constructed by the U.S. Soil Conservation Service for flood control and water conservation. The depletions range from 0 to 100 percent in a given year, depending on the physical characteristics of the impoundments and the combination of climatic and hydrologic conditions for that year. The model provides information from upstream surface water impoundments in a monthly time frame. Information required for assessing depletions includes physical characteristics of impoundments, soil maps of the area, runoff, and meteorological information collected at first order weather stations. The hydrologic response model was applied to several basins in Texas having diverse climatic and physical characteristics, with ranges in average annual runoff from 1.37 to 6.50 inches and average annual rainfall from 27 to 38 inches. (Knapp-USGS)
W75-09175

OAK GLEN WATER-RESOURCES DEVELOPMENT STUDY USING MODELING TECHNIQUES, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-09178

WATER RESOURCES DATA FOR KANSAS, 1974: PART 1. SURFACE WATER RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 7C.
W75-09180

HYDROLOGIC CONSEQUENCES OF USING GROUND WATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W75-09184

A GENERAL OUTLINE OF THE WATER RESOURCES OF THE TOPPENISH CREEK BASIN, YAKIMA INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. O. Gregg, and L. B. Laird.
Open-file report 75-19, 1975. 37 p, 17 fig, 32 ref.

Descriptors: *Water resources, *Washington, *Indian reservations, Surface waters, Groundwater, Irrigation water, Water supply, Water levels, Water balance, Hydrologic data.
Identifiers: *Yakima Indian Reservation(Wash), *Toppenish Creek(Wash).

An accounting of the overall availability of water on the Yakima Indian Reservation broadly outlines the water resources of the Toppenish Creek basin. Precipitation averages about 20 inches a year over the basin but only about 2 inches fall during the April-September growing season. However, diversions from the Yakima River make the Toppenish Creek valley one of the best agricultural areas in the State. Groundwater in the basin occurs in three distinct units: the basalt, old valley fill deposits, and young valley fill deposits. Each unit is capable of yielding more than 1,000 gallons per minute to properly constructed wells. Water levels in wells tapping the young valley fill are higher under present (1974) irrigation conditions than they were in the past, but some-water-level declines have occurred in the old valley fill in response to pumping. Water levels in the basalt wells in some areas have been lowered as much as 80 feet by pumping during the past 15 years. Some additional pumping in these areas can be allowed without lowering the water level more than a few feet. The young valley fill in the eastern part of the lower valley is the best source of groundwater in the basin. The zones of coarse sand and gravel to depths of about 150 feet in this area can produce large quantities of water. Irrigation water from the Yakima River seeps into the ground and builds up this groundwater supply. About 120,000 acre-feet of water goes into temporary storage each irrigation season in the young valley fill. (Knapp-USGS)
W75-09186

GENERALIZED NOMOGRAPHIC SOLUTION OF HOOGHOUDT EQUATIONS,
Public Power Corp., Athens (Greece). Hydroelectric Project Design Branch.
For primary bibliographic entry see Field 8B.
W75-09197

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 3B.
W75-09198

SOLUTIONS FOR UNCONFINED NON-DARCY SEEPAGE,
James Cook Univ. of North Queensland, Townsville (Australia). Dept. of Engineering.
R. E. Volker.
Journal of the Irrigation and Drainage Division, Proceedings of American Society of Civil Engineers, Vol 101, No IR1, Proceedings Paper 11203, p 53-65, March 1975. 8 fig, 1 tab, 17 ref, 2 append.

Descriptors: *Porous media, *Darcys law, *Model studies, Digital computers, Hydraulic conductivity, Reynolds number, Wells, *Seepage, Transmissivity, Permeameters, Flow nets, Drainage, Rock fill, Boundary processes, Piezometers, Head loss.
Identifiers: *Finite difference solution, Forcheimer solution.

Numerical and experimental studies of non-Darcy flow in porous media were examined. Laboratory experiments with a screened gravel included radial flow to a simulated well and a sector and two-dimensional flow through a bank with vertical sides in a flume. Permeameter tests on the gravel were used to estimate coefficients in the nonlinear relation between head loss and velocity. Results were presented of analyses performed by a finite difference solution of the appropriate partial differential equation boundary value problem. The flow nets and discharges obtained were compared with the experimental results and the corresponding solutions for Darcy flow. (Schicht-ISWS)
W75-09199

ENGINEERING CHALLENGES OF DREDGED MATERIAL DISPOSAL,
Army Engineers Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research.
For primary bibliographic entry see Field 5G.
W75-09205

ANALYTICAL MODEL OF HYDRAULIC PIPELINE DREDGE,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 8C.
W75-09206

SYSTEMS ANALYSIS OF HYDROLOGIC PROBLEMS.
For primary bibliographic entry see Field 2A.
W75-09210

THE SYNTHESIS OF HYDROLOGIC SYSTEMS ON THE ANALOG AND HYBRID COMPUTERS,
City Univ., London (England).
For primary bibliographic entry see Field 7C.
W75-09221

PRACTICAL APPLICATIONS OF HYDROLOGIC SIMULATION,
Hydrocomp International, Palo Alto, Calif.
N. H. Crawford.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 326-342. 6 fig, 1 tab, 5 ref.

Descriptors: *Simulation analysis, *Mathematical models, *Calibrations, *Algorithms, *Flood forecasting, *Flood plains, Urbanization, Rainfall, Runoff, Hydrologic data, Computers, Model studies, Hydrology, California, Illinois.
Identifiers: *Parameter adjustment, Santa Ynez River(Calif), Skokie River(Ill).

Hydrologic simulation is defined as the development and application of mathematical models to represent the time variant interaction of natural processes. A mathematical model consists of algorithms that are coded for execution on a computer. These algorithms contain parameters that can be varied to fit the model to a prototype. Parameter adjustment is called calibration of the model and may require a trial and error approach. A valid simulation model reproduces the time behavior of the prototype. The model includes functions which represent the physical processes. A physically based model will have physically defined parameters and these parameters can be adjusted easily for actual or planned changes. Two examples were given of hydrologic simulation as applied to flood forecasting and reservoir management, and flood plain mapping. Computer results were shown for real-time flood forecasting on the Santa Ynez River in California. Flood plain storage and watershed changes affect the hydrologic response of a basin to rainfall. Simulated and observed flood stages on the Skokie River near Chicago were shown. The progressive effect of urbanization on the flood peaks can be studied by using simulation. (See also W75-09210) (Singh-ISWS)
W75-09223

CONTROL RULES FOR MULTIPLE-USE RESERVOIRS AND MULTI-RESERVOIR SYSTEMS,
Water Research Association, Marlow (England).
J. A. Cole.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 343-378. 9 fig, 43 ref.

Descriptors: *Multiple-purpose reservoirs, *Systems analysis, *Dynamic programming, *Cost analysis, *Synthetic hydrology, Linear programming, Low-flow augmentation, Water supply, Flood control, Recreation, Algorithms, Reservoirs, Mathematical studies.
Identifiers: *Out-of-kilter algorithm, System decomposition.

A complex system of rivers, reservoirs, diversions, and returns can be arbitrarily decomposed into subsystems of tractable size for analysis. Where a particular need dominates, it may be possible to take some empirical shortcuts to simplify the problem. Stochastic dynamic programming can be used for certain subsystems to identify optimal control rules. Implicit cost weighting of water supply failure and water quality shortfall, given by the incremental cost of alternative measures to remedy such shortcomings, were discussed. Various mathematical programming techniques, such as linear programming, out-of-kilter algorithm, and dynamic programming for solving multi-reservoir problems were described. (See also W75-09210) (Singh-ISWS)
W75-09224

DESIGN TYPHOON MODEL FOR ESTIMATION OF PROBABLE MAXIMUM PRECIPITATION AND PROBABLE MAXIMUM FLOOD IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-09227

GUARDING OUR WATER RESOURCES, 1974 ANNUAL REPORT.
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-09243

PREAUTHORIZATION PLANNING ACTIVITIES OF THE BUREAU OF RECLAMATION, THE CORPS OF ENGINEERS AND THE SOIL CONSERVATION SERVICE FOR FISCAL YEAR 1975.
Report for Arkansas-White-Red Basins Interagency Committee, September 1974. 119 p, 12 map.

Descriptors: *Dams, *Watershed management, *Erosion control, *Flood control, *River basin development, *Water yield improvement, Water storage, Water supply, Water yield, Watersheds(Basins), Drainage, Floods, Multiple-

purpose projects, River basins, Federal government, Administrative agencies, Water resources development, Dams, Reservoirs, Fish conservation, Wildlife conservation, Irrigation, Water management(Applied), Basins, Water supply development.
Identifiers: Dam effects, Arkansas-White-Red River Basins.

A consolidated report is presented on watershed preauthorization planning activities of the Bureau of Reclamation, the Corps of Engineers, and the Soil Conservation Service for fiscal year 1975. Activities are located in the Arkansas-White-Red Basins (AWR Basins) and include the Arkansas River Basin above Keystone Dam, Cimarron and Canadian River Basins; Arkansas River Basin below Keystone Dam, White River Basin; Red River Basin above Denison Dam; and Red River Basin below Denison Dam. Numerous maps are presented. The function of the presentation is to acquaint each agency with the plans of others and achieve coordination of programs, and to assist each agency in better comprehending the inter-related planning activities, and to recognize areas where further coordination is desirable. The Bureau of Reclamation primarily appraises available municipal and industrial water resources with some consideration of irrigation, pollution abatement, flood control, recreation, and fish and wildlife conservation. Flood control is the main concern of the Corps of Engineers, while the Soil Conservation Service focuses on watershed protection. (Fernandez-Florida)
W75-09244

POST AUTHORIZATION PROJECT ACTIVITIES ANNUAL STATUS REPORT - BUREAU OF RECLAMATION.
Arkansas-White-Red-Basins Inter-Agency Committee, October 1974. 6 p.

Descriptors: *Land reclamation, *Reclamation states, *Reclaimed water, *Flood control, *River basins, Arkansas, Reclamation, Recreation, Federal Reclamation Law, Irrigable land, Conservation, Crops, Wildlife, Fish, Fish conservation, Basins, Water conservation, Multiple-purpose reservoirs, Reservoirs, Federal government, Water supply, Water yield improvement, Aqueducts, Canals, Diversion.
Identifiers: *Arkansas-White-Red-River Basins, Dam effects.

This presentation is the annual status report, as of October 1974, on post authorization project activities in the Arkansas-White-Red Basins conducted by the Bureau of Reclamation. Projects include those presently in operation and those under construction. The Bureau has ten projects in the basin on which construction is now complete; these are the Vermejo, Tucumcari, W.C. Austin, Fort Cobb and Foss Divisions of the Washita Basin Project, Norman, Cheney Division of the Wichita Project, Arbuckle, Canadian River, and Upper Colorado River Storage Project, Transmission Division. These projects furnish municipal and industrial water and provide flood control, fish, wildlife, and recreation benefits. Proposed projects will serve similar functions. These include the Fryingpan-Arkansas, Upper Colorado River Storage, and Mountain Park Projects. (Fernandez-Florida)
W75-09245

BELLE FOURCHE DAM AND GLENDO DAM-RESERVOIR ROADWAY.
For primary bibliographic entry see Field 6E.
W75-09257

CIBOLO, TEXAS, AND FRYINGPAN-ARKANSAS, COLORADO, PROJECTS.
For primary bibliographic entry see Field 6E.
W75-09258

COLLIER COUNTY WATER MANAGEMENT ORDINANCE.
For primary bibliographic entry see Field 6E.
W75-09260

RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE.
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2B.
W75-09285

FLOOD OF JUNE 1972 IN THE SOUTHERN PEACE (SMOKY RIVER) BASIN, ALBERTA,
Department of the Environment, Calgary (Alberta). Water Resources Branch.
L. A. Warner, and W. C. Thompson.
Technical Bulletin No 87, 51 p, 1974. 16 fig, 3 tab, 4 ref, 3 append.

Descriptors: *Floods, *Flood damage, Streamflow, Meteorology, Data collections, Gaging stations, Discharge measurement, Flood discharge.
Identifiers: *Smoky River, *Peace River basin.

In June 1972, more than six inches of rain fell over parts of the Peace River basin southwest of Grande Prairie, resulting in record flows in nearly all streams in that area. The rain occurred with the passage of a cold low over Central Alberta, which permitted a northeasterly upslope of warm, moist air to prevail over the southern Peace River basin for about 26 hours. Flood damage was reported in Grande Prairie, Grande Cache, Watino, and the town of Peace River. Calculations indicate that the influence of the W.A.C. Bennett Dam and a diking operation in the town probably reduced the severity of flooding at Peace River townsite. The effect of the diking operation on water levels associated with an ice jam in April 1973 is discussed. Details on agricultural flood damage incurred by farmers along Peace River system have been excerpted from 'Flood Damage Estimation, June, 1972, Athabasca, North Saskatchewan and Peace River Basins' by J.L. Knapp of Alberta Department of Agriculture. The present report contains a brief account of the flood damage, a description of the Southern Peace (Smoky River) basin, and a location map which shows the area affected by the flood, the various stream gauging and meteorological observation stations, as well as an isohyet analysis of the rainfall event. The description of the flood covers the following: meteorological analysis, flood hydrographs, maximum discharges, and maximum unit discharges. The analysis of the flood includes flood frequency analyses for two of the gauging sites and an explanation of streamflow data tables. Hourly discharge determinations are provided for seven gauging sites, and peak flow for two miscellaneous sites. (Envir-Canada)
W75-09292

STATE FINANCIAL ASSITANCE OF FLOOD CONTROL PROJECTS.
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6B.
W75-09301

DRAINAGE SYSTEM,
For primary bibliographic entry see Field 4B.
W75-09329

LAND USE AND WATER RESOURCES IN TEMPERATURE AND TROPICAL CLIMATES,
For primary bibliographic entry see Field 6D.
W75-09343

4B. Groundwater Management

DISPOSING OF LIQUID WASTES UNDERGROUND.
For primary bibliographic entry see Field 5E.
W75-08881

WATER RESOURCES INVENTORY OF CONNECTICUT--PART 5, LOWER HOUSATONIC RIVER BASIN,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 4A.
W75-08905

WASTEWATER INFILTRATION NEAR THE CITY OF MOUNT SHASTA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-08906

SUMMARY OF HYDROLOGIC DATA COLLECTED DURING 1973 IN DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W75-08908

SUMMARY STATEMENTS OF WATER RESOURCES INVESTIGATIONS IN FLORIDA, 1974-75.
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W75-08909

AVAILABILITY AND QUALITY OF GROUND WATER IN THE SUTHERLIN AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 7C.
W75-08910

WATER RESOURCES OF WISCONSIN, LOWER WISCONSIN RIVER BASIN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08913

WATER RESOURCES OF HAMILTON COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08914

GROUND WATER IN GRAY COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08915

AN ECONOMIC ANALYSIS OF THE EFFECTS OF A DECLINING GROUND WATER LEVEL IN THE RAFT RIVER BASIN, CASSIA COUNTY, IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
H. L. Schatz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-242 865, $6.25 in paper copy, $2.25 in microfiche. MS Thesis, March 1974. 162 p, 11 fig, 21 tab, 11 ref, 8 append. OWRR B-019-IDA(1).

Descriptors: *Groundwater resources, *Crop reduction, *Economic impact, *Overdraft, *Return(Monetary), *Groundwater basins, Farm management, *Idaho, Irrigation wells, Agriculture, Grains(Crops), Withdrawal.
Identifiers: Opportunity costs, Groundwater decline, *Raft River Basin(Idaho).

Several strategies are available for groundwater management. An economic analysis of four alternatives and their consequences is presented as part of a study to: (1) estimate the economic value of water pumped from the aquifer system in the Raft River, (2) estimate the benefits and costs as-

sociated with varying rates of groundwater decline in the basin on returns to farms, and (3) estimate the opportunity cost by not pumping the groundwater. Data pertaining to costs of production, returns from crops, and agricultural practices, and cropping patterns were gathered in 1972 to provide the information base for this study. Linear programming analysis using information from the activity budgets for producing crops was applied to estimate returns to operator labor and management. The impact from various rates of water level decline on the 20 year accumulated present value of net returns and annual annuity values for a farm were also estimated. Ground water decline affects farm returns, but by relatively minor amounts compared to the location of the farm and crop mix produced. The results indicate that administration of the groundwater resource to achieve 'full economic development of the resource would be more appropriate than administration to maintain reasonable pumping levels.' (Becker-Wisconsin)
W75-08921

MODELLING A GROUNDWATER AQUIFER IN THE GRAND PRAIRIE OF ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W75-08923

SALT WATER DETECTION IN THE CIMARRON TERRACE, OKLAHOMA.
Oklahoma Water Resources Board, Oklahoma City.
For primary bibliographic entry see Field 5A.
W75-08936

ESTIMATION OF THE WATER RESOURCES OF A PORTION OF THE GAMBIER PLAIN SOUTH AUSTRALIA USING A NEW METHOD FOR EVALUATING LOCAL RECHARGE,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
For primary bibliographic entry see Field 2F.
W75-08953

INVESTIGATION OF SENSITIVITY AND ERROR PROPAGATION IN NUMERICAL MODELS OF GROUNDWATER BASINS,
James Cook Univ. of North Queensland, Townsville (Australia).
For primary bibliographic entry see Field 2F.
W75-08954

TECHNIQUES FOR HANDLING INPUT DATA FOR FINITE ELEMENT ANALYSIS OF REGIONAL GROUNDWATER FLOW,
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 2F.
W75-08955

A DISCRETE KERNEL GENERATOR FOR STREAM-AQUIFER STUDIES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux, and C. J. Daly.
Water Resources Research, Vol 11, No 2, p 253-260, April 1975. 5 fig, 3 tab, 22 ref, 2 append. OWRT B-109-COLO(2). Grant 14-31-0001-4067.

Descriptors: *Surface-groundwater relationships, *Mathematical models, *Cost comparisons, *Aquifer management, *Computer models, *Conjunctive use, Economics, Water rights, Drawdown, Water wells, Porosity, Transmissivity, Regulation, Alluvial aquifers, Model studies, Finite element analysis.
Identifiers: Dupuit assumption, Boussinesq equation.

A finite difference model of the behavior of an aquifer without stream interaction was developed as a first-stage component of a management model of a stream-aquifer system. The model was not built as a usual simulator but as a discrete impulse response generator. Once the basic response coefficients were generated, the finite difference model was no longer necessary to simulate the behavior of the aquifer. Any aquifer response (e.g., return flow to a given reach for a given week) was expressed as an explicit function of the pumping rates. A complete description of the 'discrete kernel generator' was provided including the basic equations, truncation error propagation, accuracy, and run costs. (Schicht-ISWS)
W75-09078

POLICY ALTERNATIVES IN WATER RECHARGE AREAS.
East Central Florida Regional Planning Council, Winter Park.
Preliminary Report ECFRPC 74-7, July, 1974. 100 p, 14 fig, 8 tab, 18 ref, append. CPA-FL-04-29-1040.

Descriptors: *Alternative planning, Alternative water use, *Aquifer management, *Groundwater recharge, *Hydrologic budget, Recharge wells, Potentiometric level, Geology, Hydrologic aspects, Saline water intrusion, Infiltration rates, Water supply, *Florida, Water policy.
Identifiers: Floridan Aquifer, Orlando(Fla).

East central Florida is experiencing rapid population growth with the attendant increase in demand for water, supplied primarily from wells into the Floridan Aquifer. Urbanization can decrease water supply if natural recharge areas are not properly managed. At present rates of development, this region could be using 10% more water per year than naturally recharged by 1990, causing salt water intrusion and diminished well and spring flows. Water demand projections, geologic and hydrologic aspects, and recent trends in groundwater use are presented as background. Current land use controls as well as the legal bases of local, state, and regional policies which may be used for recharge area management are presented. There is currently no widespread regulatory authority for this purpose in east central Florida, though concern is increasing as the magnitude of the water supply problem becomes apparent. State designation of a large portion of Green Swamp as an Area of Critical State Concern will eventually specify development regulations to protect its recharge function. Other state and federal action is certain to have considerable effect. Sixteen widely applicable policy alternatives for local or regional governments are presented with benefits and drawbacks of each. In spite of imperfect knowledge about recharge functions, action must be taken to insure the long-range prosperity and livability of the area. (Herr-North Carolina)
W75-09095

GEOPHYSICAL EXPLORATION OF GROUNDWATER IN SOFT FORMATIONS AND ITS UTILIZATION IN MINOR IRRIGATION,
Indian Inst. of Tech., Kharagpur. Dept. of Geology and Geophysics.
H. P. Patra.
Indian J Agric Sci, Vol 42, No 10, p 883-886, 1972. Illus.

Descriptors: Exploration, Geophysics, Borehole geophysics, *Groundwater availability, Aquifers, Resistivity, Electrodes, Irrigation wells.

Geophysical exploration methods, including logging techniques, are useful in the selection of appropriate location of boreholes and in the estimation of groundwater reserve. Direct-current geoelectric sounding has been found to be the most suitable and convenient surface geophysical method for the detection of water-bearing aquifers in soft formation. Electrical-resistivity sounding with Schlumberger configuration of electrodes is usually preferred for the purpose. The electrode arrangement is outlined, and a brief discussion is given on the instrumentation, field procedure and interpretation of resistivity data leading to assessment of groundwater potential in an area. Electrical-resistivity sounding is important in the selection of drilling sites for irrigation wells.--Copyright 1974, Biological Abstracts, Inc.
W75-09103

MAP SHOWING DEPTH TO BEDROCK, PLAINFIELD QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W75-09165

MAP SHOWING DEPTH TO BEDROCK, HEATH QUADRANGLE, MASSACHUSETTS-VERMONT,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W75-09166

CONTOUR MAP OF THE BEDROCK SURFACE, BRISTOL QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-09167

CONTOUR MAP OF THE BEDROCK SURFACE, SOUTHINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-09168

WATER IN THE GREAT BASIN REGION; IDAHO, NEVADA, UTAH, AND WYOMING,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-09170

DIGITAL MODEL ANALYSIS OF THE PRINCIPAL ARTESIAN AQUIFER, GLYNN COUNTY, GEORGIA,
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W75-09171

A GALERKIN-FINITE ELEMENT ANALYSIS OF THE HYDROTHERMAL SYSTEM AT WAIRAKEI, NEW ZEALAND,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-09176

SALT-BALANCE STUDY OF PAUBA VALLEY, UPPER SANTA MARGARITA RIVER AREA, RIVERSIDE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-09177

OAK GLEN WATER-RESOURCES DEVELOPMENT STUDY USING MODELING TECHNIQUES, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
W. R. Powers, III, and W. F. Hardt.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 429, $4.25 in paper copy, $2.25 in microfiche. Water-Resources Investigations 31-74, December 1974. 59 p, 13 fig, 9 tab, 24 ref.

Descriptors: *Mathematical models, *Computer models, *Water resources, *Imported water, Water demand, *California, Economic feasibility, Groundwater resources, Surface waters, Surface water availability, Hydrologic data, *Conjunctive use.
Identifiers: Oak Glen area(Calif), San Bernardino County(Calif).

In the Oak Glen area, San Bernardino County, California, hydrologic, digital-model and economic analyses were made to determine the most efficient balance of conjunctive use of local groundwater and surface water--specifically, whether additional groundwater supplies could be developed for local use and also for export to the adjacent Yucaipa area, and what would be the effects of imported water available in 1980. Transmissivity values of the aquifer ranged from 1,000 to 6,750 gallons per day per foot or their equivalent 134 to 902 square feet per day (12 to 84 metres squared per day) and that net annual recharge was about 1,940 acre-feet (2.39 cubic hectometres) per year. The volume of groundwater in storage in 1970 was about 86,000 acre-feet (106 cubic hectometres). The economic evaluation suggests: (1) increase groundwater pumping for local use, (2) reduce well-water import to the lower parts of the Oak Glen study area from adjacent areas to the west, (3) short term prior to 1980 overdevelopment appears to be feasible with export to Yucaipa, and (4) tunnel development or new shallow wells at the higher altitudes could help alleviate the water problem. (Woodard-USGS)
W75-09178

HYDRAULIC CHARACTERISTICS AND WATER-SUPPLY POTENTIAL OF THE AQUIFERS IN THE VICINITY OF THE WASTE-WATER TREATMENT PLANT, SOUTH BEND, INDIANA,
Geological Survey, Indianapolis, Ind.
J. R. Marie.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 238, $3.75 in printed copy, $2.25 in microfiche. Water-Resources Investigations 49-74, February 1975. 26 p, 13 fig, 9 ref.

Descriptors: *Groundwater resources, *Water supply, *Aquifer characteristics, *Indiana, Model studies, Water yield, Forecasting, Wells, Pumping, Dewatering, Construction, Treatment facilities, Waste water treatment, Hydrologic data, Transmissivity, Groundwater recharge.
Identifiers: *South Bend(Ind).

An intensive study was made of a 24-square mile area surrounding the South Bend, Indiana wastewater treatment plant. This was done to (1) document the effects of dewatering about 40 feet of the 130-ft thick aquifer during construction at the plant; (2) define the hydrologic system in order to allow development of a predictive model; and (3) select and evaluate one possible water-supply development plan as a model demonstration. Model-simulated water levels agree very well with those observed, both before and during dewatering. Consequently, the model was used to predict effects of developing 28 million gallons per day from three hypothetical well fields. Model results indicate that the hydrologic system can sustain this withdrawal indefinitely with little effect on groundwater levels. The quantity diverted from the St. Joseph River is less than 10 percent of the estimated minimum daily flow. (Woodard-USGS)
W75-09179

HYDROLOGIC CONSEQUENCES OF USING GROUND WATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. W. Stewart, and G. H. Hughes.
Florida Bureau of Geology, Tallahassee, Report of Investigations No 74, 1974. 41 p, 20 fig, 2 tab, 3 ref.

Descriptors: *Lakes, *Water levels, *Water transfer, *Groundwater, *Florida, Water wells, Pumping, Aquifers, Water yield, Limnology, Chemical properties, Hydrologic data.
Identifiers: *Tampa area(Fla), Groundwater supplement to lakes, Lake level maintenance.

Lake levels about 12 miles north of Tampa, Florida, have been lower than normal in recent years owing to less-than-normal rainfall and a lowering of groundwater levels by large withdrawals from the Floridan Aquifer. By pumping Floridan Aquifer water into the lakes, local residents have stabilized the levels of Round Lake since mid-1966 and of Saddleback and Charles Lakes since mid-1968. Total pumpage into the lakes ranged from 217 million gallons in 1969 to 401 million gallons in 1971; the large increase in pumpage is attributed to weather conditions which were drier in 1971 than in 1969. In 1971 pumpage averaged 143,000 gpd at Round Lake; 468,000 gpd at Saddleback Lake; and 492,000 gpd at Lake Charles. These values represent the water required to maintain lake levels at a nearly constant level which generally was above the level that would have occurred naturally. (Woodard-USGS)
W75-09184

A GENERAL OUTLINE OF THE WATER RESOURCES OF THE TOPPENISH CREEK BASIN, YAKIMA INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W75-09186

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE TEHAMA-COLUSA CANAL SERVICE AREA, SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
R. P. Fogelman.
Open-file report, April 1975. 52 p, 3 fig, 28 map, 4 tab.

Descriptors: *Chemical analysis, *Water quality, *Groundwater, *Wells, *California, Data collections, Hydrologic data, Sampling, Sites, Well data, Water levels, Pumping, Water yield, Drawdown

The Tehama-Colusa Canal Service Area is in the Northwestern part of the Sacramento Valley, in parts of Yolo, Colusa, Glenn, and Tehama Counties, Calif. The area includes 450 square miles (1,160 square km). The boundaries are: West, the eastern slopes of the Coast Ranges; north, Elder Creek; northeast, the Sacramento River and the Glenn-Colusa Canal; east and southeast, the Colusa Basin Drainage Canal; and south, Oat Creek. Between August and October 1974, water samples were collected for chemical analysis from 222 wells. Field determinations of alkalinity, conductance, pH, and temperature were made on the site at the time of sampling. The samples were then field prepared for shipment and analysis for individual constituents at the Geological Survey Central Laboratory, Salt Lake City, Utah. Descriptive data for water wells, chemical data, and location of the wells are included. (Woodard-USGS)
W75-09187

ESTIMATED GROUND-WATER FLOW, VOLUME OF WATER IN STORAGE, AND POTENTIAL YIELD OF WELLS IN THE POJOAQUE RIVER DRAINAGE BASINS, SANTA FE COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N.Mex.
F. C. Koopman.
Open-file report, May 1975. 33 p, 7 fig, 2 tab, 5 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Well data, *New Mexico, Pumping, Water yield, Specific capacity, Drawdown, Groundwater recharge, Surface-groundwater relationships.
Identifiers: *Pojoaque River basin(NMex).

The hydrology of a major part of the Pojoaque River drainage basin, a tributary of the Rio Grande in north-central New Mexico, was studies by the U.S. Geological Survey at the request of the Bureau of Indian Affairs. The flow of groundwater in the alluvium and Tesuque Formation was estimated (after constructing a resistance model, drilling exploratory holes, and conducting tests) to be about 2.7 cubic feet per second toward the Rio Grande for each section 1 mile wide. The volume of groundwater in storage, estimated from geologic information and assumed values of porosity, is about 5.5 x 10 to the 7th power acre-feet for the Tesuque Formation, and about 13,300 acre-feet for the alluvium. Shallow wells constructed in the alluvium yield 10 gallons per minute per foot of drawdown. Wells in the alluvium have a specific capacity about 200 times that of wells in the Tesuque Formation. Wells penetrating 1,000 feet of aquifer of the Tesuque Formation may yield several hundred gallons per minute with long-term depletion effects on both the overlying alluvium and surface-water sources. (Woodard-USGS)
W75-09188

UPWARD MIGRATION OF DEEP-WELL WASTE INJECTION FLUIDS IN FLORIDAN AQUIFER, SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W75-09190

PRELIMINARY FINDINGS OF A LEACHATE STUDY ON TWO LANDFILLS IN SUFFOLK COUNTY, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-09191

GENERALIZED NOMOGRAPHIC SOLUTION OF HOOGHOUDT EQUATIONS,
Public Power Corp., Athens (Greece). Hydroelectric Project Design Branch.
For primary bibliographic entry see Field 8B.
W75-09197

SOLUTIONS FOR UNCONFINED NON-DARCY SEEPAGE,
James Cook Univ. of North Queensland, Townsville (Australia). Dept. of Engineering.
For primary bibliographic entry see Field 4A.
W75-09199

SOME PROBLEMS IN THE APPLICATION OF SYSTEMS ANALYSES IN WATER RESOURCES SYSTEMS,
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 3B.
W75-09226

OPTIMAL OPERATION OF SURFACE AND GROUNDWATERS FOR POLLUTION DILUTION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-09230

NITROGEN CONTENT OF SHALLOW GROUND WATER IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-09232

COLLIER COUNTY WATER MANAGEMENT ORDINANCE.
For primary bibliographic entry see Field 6E.
W75-09260

DRAINAGE SYSTEM,
D. A. Alsberg, and G. R. Alsberg.
United States Patent 3,837,168. Issued September 24, 1974. Official Gazette of the United States Patent Office, Vol 926, No 4, p 1181, September, 1974. 1 fig.

Descriptors: *Patents, *Flooding, *Groundwater recharge, *Drainage systems, *Flood proofing, Flood control, Drainage wells, Drainage programs, Drainage water, Groundwater resources.

A drainage system will reduce flooding and simultaneously recharge underground water supplies. The system consists of dry wells which connect to underground water sources, structures for carrying the water to the dry wells, and storage basins where excess water can be stored temporarily until the dry wells can discharge it to the water supplies. (Orr-FIRL)
W75-09329

4C. Effects On Water Of Man's Non-Water Activities

COST ANALYSIS OF EXPERIMENTAL TREATMENTS ON PONDEROSA PINE WATERSHEDS,
Forest Service (USDA), Tucson, Ariz. Rocy Mountain Forest and Range Experiment Station.
J. M. Turner, and F. R. Larson.
USDA Forest Service, Research Paper RM-116, March, 1974, 12 p, 8 fig, 8 tab, 4 ref.

Descriptors: *Forest watersheds, *Costs, *Ponderosa pine trees, *Slopes, *Regression analysis, Watersheds(Basins), Cost analysis, Watershed management, Timber sites, Forecasting, Harvesting, *Arizona.
Identifiers: Sensitivity analysis, Basal area.

Treatments were prescribed for five ponderosa pine watersheds in order to develop a cost prediction model for experimental and operational applications. A sensitivity analysis was used to test effects of labor, equipment, materials, slope steepness, and stand density on treatment of cost. Types of watershed treatments subjected to cost analysis included a regular one-third stripcut, clearcut, irregular one-third stripcut, irregular one-half stripcut, and a severe thin. Regression models were developed which predict various logging costs as a function of the timber basal area removed. The use of basal area removals as a cost indicator averages out a number of forest conditions such as slope steepness, which might affect costs. (Mastic-Arizona)
W75-08940

HYDROLOGY OF PATCH CUTS IN LODGEPOLE PINE,
Colorado State Univ., Fort Collins. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W75-08947

COMPARATIVE EVALUATION OF THREE URBAN RUNOFF MODELS,
Canada Centre for Inlands Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W75-08988

UROS4: URBAN FLOOD SIMULATION MODEL PART 1. DOCUMENTATION AND USERS MANUAL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-09046

UROS4: URBAN FLOOD SIMULATION MODEL PART 2. APPLICATIONS TO SELECTED DEKALB COUNTY WATERSHEDS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-09047

CHANGES IN STORM HYDROGRAPHS DUE TO ROADBUILDING AND CLEARCUT LOGGING ON COASTAL WATERSHEDS IN OREGON,
Oregon State Univ., Corvallis. Water Resources Research Inst.
J. T. Krygier, and R. D. Harr.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 942, $4.25 in paper copy, $2.25 in microfiche. Project Termination Report, August 1972. 57 p, 3 fig, 11 tab, 41 ref, append. OWRT A-001-ORE(15).

Descriptors: *Clearcutting, *Lumbering, *Peak discharge, *Oregon, Hydrology, Watersheds(Basins), Drainage, Coasts, Small watersheds, Hydrographs, *Forest watersheds, *Road construction.
Identifiers: *Alsea watershed(Ore), Coastal watersheds, Storm hydrographs.

Construction of roads in the Alsea forested watershed, lead to an increase in peak discharge as much as 50 percent in the fall months and 21 percent in winter. No volume changes from road construction were detected among the watersheds. The influence of roads on peak discharge at the outlet of a larger watershed was not detectable. Clearcutting without effects of roads and slash burning induced changes in peak discharge of 128 percent for fall months and 22 percent for the winter 'recharged' period. Clearcutting increased peaks by 90 percent in fall and 28 percent in winter. The results of this study cannot be extrapolated to peak discharges beyond a 10-year return period. (See also W71-04968)
W75-09048

POLICY ALTERNATIVES IN FLOOD PLAINS.
East Central Florida Regional Planning Council, Winter Park.
For primary bibliographic entry see Field 6F.
W75-09094

POLICY ALTERNATIVES IN WATER RECHARGE AREAS.
East Central Florida Regional Planning Council, Winter Park.
For primary bibliographic entry see Field 4B.
W75-09095

ROCK VALLEY METROPOLITAN COUNCIL REGIONAL DEVELOPMENT GUIDE.
Rock Valley Metropolitan Council, Rockford, Ill.
For primary bibliographic entry see Field 6B.
W75-09106

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 4A.
W75-09122

A MATHEMATICAL MODEL OF URBAN STORM DRAINAGE,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 5D.
W75-09225

BIOLOGICAL VIEW OF PROBLEMS OF URBAN HEALTH,
John Curtin School of Medical Research, Canberra (Australia). Dept. of Human Biology.
For primary bibliographic entry see Field 6G.
W75-09332

4D. Watershed Protection

EROSION-PROOFING DRAINAGE CHANNELS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
C. J. Posey.
Journal of Soil and Water Conservation, Vol 28, No 2, March-April, 1973, p 93-95, 3 p, 5 fig, 7 ref. OWRR A-035-CONN(3). 14-31-0001-3807.

Descriptors: *Erosion, *Soil erosion, *Drainage effects, Urbanization, Concretes, Gullies, Gully erosion.
Identifiers: *Erosion-proofing, *Drainage channels, Rock linings, Reverse filters.

A large portion of soil eroded from land is scoured from the beds and banks of natural channels that are dry much of the time. As urbanization spreads, storm runoff peaks exceed the capacity of natural channels more frequently. To improve channels, methods of preventing erosion include lining with grass, concrete drop structures, lining with asphalt or concrete or rock linings. Rock linings have the problems of staying in place and fine-material wash. The use of reverse filter techniques developed by Terzaghi may be used to prevent this type of failure. Erosion-proofing of water channels also serves to prevent the growth of gullies and gully erosion. (Deitchman-Connecticut)
W75-08925

CONSTRUCTION REQUIREMENTS AND COST ANALYSIS OF GRASSED BACKSLOPE TERRACE SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
H. D. Wittmuss.
Transactions of ASAE, Vol 16, No 5, 1973. p 970-972, 1 fig, 4 tab, 10 ref. OWRT A-029-NEB(1). 14-31-0001-4027.

Descriptors: *Terracing, Grassed waterways, Conservation, *Erosion control, *Construction costs, *Cost analysis, Systems analysis, *Nebraska, *Installation costs, Computer programs, Maps.

A method of terrace system analysis has been developed which can be used to predict the cost of parallel grassed backslope terrace systems with grassed or underground waterways. This analysis is based on the length of waterway and the area of land positioned above the bottom terrace in the field. The cost and construction requirements of four parallel grassed backslope terrace systems constructed over a 5-year period (1966-1970) were analyzed. The average cost of the grassed backslope terrace systems installed at Lincoln, Nebraska was $37.22 per acre terraced for each moving and $1.11 per ft. for clay tile waterway for a total of $82.25 per acre terraced. The use of a topographic map and a computer program to design the terrace system and plastic tubing for waterways reduced the technical input time requirement and installation costs of the parallel storage type terrace systems.
W75-08926

ENVIRONMENTAL ASPECTS--SACRAMENTO BANK PROTECTION,
Hydrologic Engineering Center, Davis, Calif. Water Resources Planning Branch.
C. S. Mifkovic, and M. S. Petersen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY5, Proceedings Paper 11326, p 543-555, May 1975. 7 fig, 5 ref, 1 append.

Descriptors: *Bank protection, *Environmental effects, *Erosion, *Flood control, Hydraulics, Levees, Riparian plants, Wildlife habitats, Design, *California, Retaining walls, Rivers, Erosion control, Aesthetics.
Identifiers: *Sacramento River(Calif).

Studies show that bank protection can include environmental measures and can preserve environmental values from erosion. Reclamation of the Sacramento Valley, California, included Federal construction of a leveed flood-control project. Erosion has threatened the integrity of the levee system and a program of revetment construction at critical sites was authorized in 1960. Early construction was on a least-cost basis and seriously reduced riparian vegetation which supplies important wildlife habitat in the semi-arid valley. Alternative revetment designs and construction procedures have been developed to minimize adverse environmental effects. (Dawes-ISWS)
W75-08981

PREAUTHORIZATION PLANNING ACTIVITIES OF THE BUREAU OF RECLAMATION, THE CORPS OF ENGINEERS AND THE SOIL CONSERVATION SERVICE FOR FISCAL YEAR 1975.
For primary bibliographic entry see Field 4A.
W75-09244

POST AUTHORIZATION PROJECT ACTIVITIES ANNUAL STATUS REPORT - BUREAU OF RECLAMATION.
For primary bibliographic entry see Field 4A.
W75-09245

PROGRESS IN WATERSHED DEVELOPMENT IN THE AWR BASINS AREA UNDER USDA PROGRAMS - SEPTEMBER 1974.
Soil Conservation Service, Wichita, Kans.
Presented at Meeting--Arkansas-White-Red Basins Inter-Agency Committee, Wichita, Kansas, October 1974. 18 p, 1 tab.

Descriptors: *Watershed Protect and Flood Prev. Act, *Watershed management, *Erosion control, *Flood control, *Sediment control, Legislation, Control, Land management, Soil management, Water management(Applied), Floods, Flow, Water control, Water policy, Agriculture, Flood protection, Investigations, Surveys, Programs, Soil conservation, Federal government, Administrative agencies.
Identifiers: *Administrative regulations, Environmental policy.

Four congressional enactments authorize participation of the Department of Agriculture in watershed programs. The first watershed program was initiated under the Flood Control Act of 1944 for the purpose of soil erosion prevention, waterflow retardation, and other improvements to prevent floodwater and sediment damage. Existing authority in 1953 provided for the second program which involved the installation of improvements on 60 pilot watersheds throughout the country. The Watershed Protection and Flood Prevention Act authorized the third program in 1954, providing for Federal assistance in the installation of improvements, and authorizing the Secretary of Agriculture to make investigations and surveys of the watersheds of rivers and other waterways as a basis for the development of coordinated programs. A fourth watershed program was made possible by the Food and Agriculture Act of 1962 and authorized the Secretary to provide technical assistance to sponsors of Resource Conservation and Development projects. A progress report is presented of watershed development in the Department of Agriculture, and includes construction status as well as information relating to land treatment which is vital to the watershed protection and flood prevention program. (Fernandez-Florida)
W75-09246

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

OXYGEN CONTENT AND B. O. D. OF EFFLUENTS MEASUREMENT.
German Patent 55341V/31. Applied May 9, 1973. Issued July 25, 1974. Derwent German Patents Report, Vol 5, No 31, p 2-3, July, 1974.

Descriptors: *Patents, *Biochemical oxygen demand, *Effluents, Measurement, *Oxygenation, Electrodes, Activated sludge, *Pollutant identification, Instrumentation.

A patent was granted for measurement of oxygen content and BOD of effluents. This involves an electrode with a movable collar which prevents fresh liquor from entering a cell during BOD determination. The electrode measures both the effectiveness of the oxygenation of an activated sludge process and the residual BOD. Oxygenation is measured by pumping the aqueous effluent past the cell. To measure biochemical oxygen demand, a collar is slid down, sealing on O-rings, and traps a sample within the cell. As the oxygen is consumed, the signal given declines and the BOD can be calculated from this rate of decline. (Prague-FIRL)
W75-08851

FLOW PHOTOMETER (DURCHFLUSS-PHOTOMETER).
Galvanotechnik, Vol 65, No 9, p 611, July, 1974. 1 fig.

Descriptors: *Analytical techniques, *Instrumentation, *Turbidity, Photometry, Design, Waste water, Calibrations, Water analysis, *Pollutant identification.
Identifiers: *Flow photometer.

A flow photometer was designed by the Bruno Large Company of Duesseldorf, West Germany, for the continuous control of the turbidity of water and waste water. Based on the light scattering principle, the photometer uses a beam deviated by 90 degrees for the detection of turbidity-generating particles by the Tyndall effect. The possible soiling of the cuvette is compensated for by an extra beam going directly through the cuvette. Kieselguhr or formacin solution can be used for calibration. (Takacs-FIRL)
W75-08858

AUTONOMOUS, AUTOMATIC APPARATUS FOR WATER POLLUTION CONTROL (APPARECCHIO PER IL CONTROLLO AUTOMATICO DEGLI INQUINAMENTI DELL ACQUA CON AUTONOMIA DI FUNZIOAMENTO).
Inquinamento Acqua Aria Suolo, Vol 16, No 6, p 11, June, 1974.

Descriptors: *Automation, *Measurement, *Dissolved oxygen, *Water temperature, Instrumentation, Data collections, Water pollution control, Measurement, *Pollutant identification.

An automatic apparatus developed by a British company for the continuous measurement and recording of the dissolved oxygen content and the water temperature in rivers, sewers, canals, lakes and basins is described. The battery-powered unit is suitable for autonomous operation for up to six weeks, with the battery having to be changed once a week. The apparatus is portable and can be implanted at depths of up to 30 meters. The measuring intervals can be selected between one minute and two hours by means of a built-in timer. The measurement data is recorded numerically. (Takacs-FIRL)
W75-08859

MUNICIPAL WASTEWATER BACTERIA CAPABLE OF SURVIVING CHLORINATION,
Texas Univ., Houston. School of Public Health.
For primary bibliographic entry see Field 5D.
W75-08876

TLC FINDS HEXANE SOLUBLES,
Western Electric Co., Inc., Chicago, Ill. Hawthorne Works.
H. Atanus.
Water and Wastes Engineering, Vol 11, No 10, p 26, 28, October 1974. 4 fig, 1 tab.

Descriptors: *Analytical techniques, *Pollutant identification, *Oil wastes, *Chromatography, Sampling, *Industrial wastes, Costs, Illinois, Oil pollution.
Identifiers: *Hexane solubles, Thin-layer chromatography, Chicago(Ill).

An analysis by thin layer chromatography of hexane solubles is described, for the detection of oil wastes in outfalls from plant discharges. The Metropolitan Sanitary District of Chicago conducts source sampling, direct measurement of waste water from each industrial complex in its area. If wastes are to be discharged into the sewage system, the limit of the amount of oil must be under 100 mg/liter. Oil is usually removed by standard techniques, such as skimming settling tanks and filtration before releasing treated sewer effluents. To identify and separate some of the hexane solubles (those relatively non-volatile organic material soluble in hexane), the thin layer chromatography method is utilized. A small quantity of hexane solubles is placed near the edge of a plastic or glass sheet coated with silica gel sorbent. When the glass is placed in an appropriate mixture of solvents, the solvents travel up the coated sheet with different affinities of the sample constituents travelling different distances. Separated components may be visualized with ultraviolet light or color-forming chemical reactions. Spotter solvents for detecting specific organic mixtures were: petroleum ether, ethyl acetate, acetic acid; petroleum ether, ethyl acetate, ammonium hydroxide; and benzene, methyl alcohol, ammonium hydroxide. Good separations were obtained by this method, without the use of costly or sophisticated equipment. Concentrations were measurable at the nanogram to the milligram level, and the technique is portable. (Prague-FIRL)
W75-08885

DETERMINATION OF THE AMMONIUM CONTENT IN WASTE WATERS BY MEANS OF THE AIR GAP ELECTRODE,
Technical Univ. of Denmark, Lyngby. Dept. of Chemistry.
J. Ruzicka, E. H. Hansen, P. Bisgaard, and E. Reymann.
Analytica Chimica Acta, Vol 72, No 1, p 215-219, September 1974. 1 tab, 11 ref.

Descriptors: *Analytical techniques, *Ammonia, Equipment, *Water analysis, *Pollutant identification, *Electrodes, Electrolytes, Water quality control.
Identifiers: Air-gap electrode, Indophenol method.

The indophenol method has been recommended for the determination of ammonia in an aqueous solution. However, this method is time-consuming and subject to serious interference from mercury and iron ions and soluble sulphides. To minimize sample handling and the likelihood of contamination and to avoid the interferences of the indophenol method, ammonia-specific electrodes have been developed. The basic principle of these electrodes is the use of a hydrophobic gas-permeable membrane which separates the alkaline test solution from an internal solution of ammonium chloride of fixed molarity and the immersion of a glass pH electrode and a reference electrode in the internal solution. The air-gap electrode is similar to other gas sensors but the gas-permeable membrane is replaced by the air gap which separates the electrolyte layer from the sample solution. The greatest advantage of the air-gap electrode is that the electrode is never in direct contact with the sample solution. Instead the electrolyte is adsorbed as a very thin film on the surface of the indicator electrode. Additional advantages include simplicity of design, ease of renewal of the electrolyte, and fast response. (Orr-FIRL)
W75-08886

TWO NEW WATER MONITORS AVAILABLE.
Chemical and Engineering News, Vol 52, No 42, p 33-34, October 21, 1974.

Descriptors: *Monitoring, *Instrumentation, *Water quality control, *Chlorine, Aquatic environments, Water treatment, Waste water treatment, Regional analysis, *Pollutant identification, Measurement.
Identifiers: Ultrasonic cleaning, Chlorine detectors.

Two new water pollution monitoring instruments have recently been developed. The first is a portable, inexpensive chlorine detector, used for measuring instantaneous chlorine levels in all aquatic environments. It was produced by the National Bureau of Standards, and will detect total chlorine in the parts-per-billion range, an extremely sensitive measurement. This NBS chlorine monitor may be used for wildlife protection as well as to measure effectiveness of municipal water treatment plants and waste water plants. The second water pollution monitoring instrumentation is an elaborate system introduced by Philips Electronic Instruments. This system automatically provides for continuous surveillance of up to seven water quality parameters, including redox potential, pH, pCl, dissolved oxygen concentration, electrical conductivity, temperature, and turbidity. The station can be programmed to operate unattended for up to five weeks, or it can feed data directly into a processing station by way of a communications network. The Philips water monitoring station has the unusual feature of automatic cleaning of its sensors regularly with an ultrasonic cleaner. In addition to the use of this monitoring system by itself, it is suggested that greater potential might be achieved in water quality control with an integrated network of stations to monitor regional and perhaps national water characteristics. (Prague-FIRL)
W75-08887

OCCURRENCE AND DETERMINATION OF INORGANIC POLLUTING AGENTS (IN GERMAN),
Munich Univ. (West Germany). Institut fuer Wasserchemie und Chemische Balneologie.
K.-E. Quentin, and H. A. Winkler.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. 158(6): 514-523, 1974. (In Ger. with Ger. and Engl. summ.).

Descriptors: Pollutants, *Water pollution sources, *Inorganic compounds, Phosphorus, Eutrophication, Water pollution effects, *Sampling, *Analytical techniques, Rivers, Lakes, Europe, *Heavy metals, Metals, Potable water, *Water treatment.
Identifiers: Drinking water, *Germany, West Germany, Danube River, Lake Constance.

The definition of a polluting agent applied to all solid or gaseous substances or organisms in the water which directly or indirectly impair biocoenosis and utilization of the water. They can be inconvenient, impair health or have a toxic effect. Phosphorous which becomes active indirectly is an inorganic polluting agent. The eutrophication of waters caused by phosphorus demonstrates the effect on aquatic life and on the purity of drinking water. The heavy metals, for which various countries and organizations have established limiting values, are cationic inorganic polluting agents. Sampling methods and apparatus for monitoring heavy metals are described. Results of a research project on heavy metals in the Bavarian part of the Danube River and in Lake Constance near Linaur, West Germany, are described. Water tests are concerned with dissolved substances and also with metals bound to substances causing turbidity or to sediments. These metals may remobilize. Procedures for elimination of such substances in the preparation of drinking water are discussed.--Copyright 1975, Biological Abstracts, Inc.
W75-08888

DETERMINATION OF NON-IONOGENIC SURFACTANTS IN WASTEWATERS BY THIN-LAYER CHROMATOGRAPHIC METHOD (OPREDELENIYE NEIONOGENNYKH POVERKHNOSTNO AKTIVNYKH VESHCHESTV V STOCHNYKH VODAKH METODOM KHROMATOGRAFII V TONKOM SLOYE),
N. M. Yudina, and A. A. Cherkasskiy.
Zavodskaya Laboratoriya, Vol 40, No 6, p 642-644, 1974. 1 fig, 2 tab, 4 ref.

Descriptors: *Extraction, *Surfactants, *Analytical techniques, Waste water, *Chromatography, *Pollutant identification.
Identifiers: Thin-layer chromatography, Eluents.

Extraction and a thin-layer chromatographic method for the quantitative determination of nonionogenic surfactants, such as oxyethylated dodecyl alcohol, oxyalkylated dodecyl alcohol, polyoxyethylated polyoxypropylene glycol, polyoxyethylated polyoxyethylene diamine, and oxyethylated amides of synthetic fatty acids of the C10-C16 fraction, in industrial as well as other waste waters are described. Following extractive enrichment by means of chloroform at a recovery rate of 95-98%, the extract is applied on alumina layer, and 50:1.5 ratio of chloroform and ethanol is used as eluent. The spots are visualized by means of Draggendorf's reagent. (Takacs-FIRL)
W75-08889

DETERMINATION OF HEAVY METALS IN MUNICIPAL SEWAGE PLANT SLUDGES BY NEUTRON ACTIVATION ANALYSIS,
North Carolina State Univ., Raleigh. Nuclear Services Lab.
J. N. Weaver, A. Hanson, J. McGaughey, and F. J. Steinkruger.
Water, Air, and Soil Pollution, Vol 3, No 3, p 327-335, September, 1974. 5 fig, 3 tab, 10 ref.

Descriptors: *Analytical techniques, *Sewage sludge, *Neutron activation analysis, Municipal wastes, Urban runoff, Water pollution effects, Sewage treatment, *Pollutant identification, North Carolina, Treatment facilities, *Heavy metals.
Identifiers: *Trace metals.

Six North Carolina cities of varying sizes and degrees of industrialization were compared in terms of trace metals content of their sewage sludges. The method used was Neutron Analysis, using a Low Energy Photon Detector. The knowledge of trace metal concentrations has application in: determining whether industralized municipal sludge is polluted by industrial sources which are exceeding the effluent limits on heavy metals set up by the EPA; determining the effect of urban runoff by analysis of a basically rural municipal sludge; detecting the gradual build-up of heavy metals which could indicate future inhibition of the bacterial action on the sewage treatment; assessing the potential environmental hazards posed by use of such sludges by farmers; and determining possible air pollution problems associated with final disposal of such sludges by burning in sludge incinerators. The metals of particular interest were Hg, Se, Cr, Sb, Co and Fe. It was found that high levels of trace metals, including heavy metals, do exist in certain sewage sludges from North Caolina municipal treatment plants,and are likely to exist in other United States cities. With the use of Neutron Activation Analysis as a multi-element analytical scanning tool, however, most of the pollution problems associated with these sludges could be traced and removed. (Prague-FIRL)
W75-08891

F2 COLIPHAGE AS TRACER IN WASTE-WATER BASIN,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Health.
For primary bibliographic entry see Field 5D.
W75-08893

CONTAMINATION OF WATER BY SYNTHETIC POLYMER TUBES,
Iowa State Univ., Ames. Dept. of Chemistry.
G. A. Jung, H. J. Svec, R. D. Vick, and M. J. Avery.
Environmental Science and Technology, Vol 8, No 13, p 1100-1106, December, 1974. 4 fig, 3 tab, 44 ref.

Descriptors: *Gas chromatography, *Mass spectrometry, *Polymers, *Plastics, Water pollution, Analytical techniques, Construction materials, *Pollutant identification.
Identifiers: *Organic contamination, Polyethylene, Polyvinylchloride.

An accurate method for testing polymer tubes intended for use in situations which require flowing water or water solutions is described. Identifications of polymer additives such as plasticizers were made by a combination of gas chromatography-mass spectrometry. Contaminants in effluent water were isolated by sorption on macroreticular resin beads, contained in a small glass column. These sorbed organic compounds were then eluted with diethylether, the eluate was concentrated by evaporation, and the organic contaminants were separated and measured quantitatively by gas chromatography. The results showed detection of organic contamination ranging from one to 5000 parts per billion by weight where water had flowed through tubes of polyethylene, polypropylene, black latex, six different formulations of polyvinylchloride, and plastic garden hose. (Prague-FIRL)
W75-08894

WASTE WATER LEVEL MEASUREMENT.
Process Biochemistry, p 22, October, 1974.

Descriptors: *Instrumentation, *Sewers, *Waste water(Pollution), *Measurement, Automation, Manholes, Analytical techniques, Equipment, Planning, *Pollutant identification.
Identifiers: *Waste water levels, Dipper.

A new precision instrument has been designed for measurement of waste water levels in sewers. Portacel, Limited is marketing the Dipper, which relies for its measurement accuracy on an electrically-activated non-corroding thin steel probe. The probe is lowered into a manhole on a 25-ft length of wire until it touches the surface of the water.

The probe withdraws automatically to just above the surface, then again touches the water and repeats the withdrawal, every five seconds. Changes in the rise and fall of the water level are recorded on a circular graph chart. Readings may be provided for a 24-hour period of for a seven day period. The dipper is available in two models, one for permanent installation and one portable. Each is powered by a rechargable 12-V wet battery, contained within specially designed equipment which clamps to the sides of the sewer shaft just below the manhole. Uses of this instrument include location and isolation of sections in sewer systems where wet weather infiltration is a problem. As a portable piece of equipment, the Dipper can be used to test both existing lines and to determine sewerage requirements of new and planned projects. (Prague-FIRL)
W75-08896

INSTRUMENTATION FOR FILTRATION TESTS,
Coulter Electronics, Inc., Hialeah, Fla.
S. Kinsman.
Chemical Engineering Progress, Vol 70, No 12, p 48-51, December, 1974. 2 fig, 13 ref.

Descriptors: *Instrumentation, *Filtration, *Photometers, Suspended solids, Particle size, Sampling, Calibrations, Electronic equipment, Automation, *Pollutant identification, Testing, Waste water treatment.
Identifiers: *Particle count, *Filter testing, Particle suspension, One-by-one particle counters.

The use of modern electronics has added sophistication to filtering devices. While microscope slides have been used for counting and sizing particles for filter evaluation, statistical variation, human error, and lack of speed make this method unattractive. Photometers, such as turbidimeters and nephelometers have been an on-stream method of filter testing. They sense and measure a form of light passed through liquid suspending a particulate, as an indication of the mass of the suspended particles. Another technology, involving electronics and automation, is the use of one-by-one particle counters for filter testing. Analysis time is minimal, and computer evaluated results are produced directly from the instrument. Particles being counted are usually displayed on a video screen for visual evaluation of the sample. The particles are sampled directly from a liquid suspension for counting and sizing. The particle suspension is formed through a critical volume where particles are detected individually. Three forms of critical volume detection are light scatter, light interruption, and Coulter principle or electric current flow interruption. Instruments manufactured by the Royco Instrument Company and the Climet Corporation for light scattering are described. A light interference instrument is available from Hiac, Division of Pacific Scientific Company, and a Coulter principle instrument is made by Coulter Electronics Incorporated. Results obtained from one-by-one particle counters are dependent upon representative sampling of the test suspension, proper dispersion of the dust samples and reproducibility of instrument calibration. (Prague-FIRL)
W75-08897

DETERMINATION OF CHLORINE-CONTAINING ORGANICS IN CHLORINATED SEWAGE EFFLUENTS BY COUPLED 36CL TRACER--HIGH RESOLUTION CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
R. L. Jolley.
Environmental Letters, Vol 7, No 4, p 321-340, 1974. 6 fig, 3 tab, 58 ref.

Descriptors: *Sewage treatment, *Chlorine, *Organic compounds, *Radioactive tracers, Chromatography, *Pollutant identification, Effluents, Toxicity, Waste water treatment, Sewage effluents.
Identifiers: Chlorine residuals.

Concern has been expressed that chlorination of effluents from sewage treatment plants for disinfection may yield stable chlorine-containing organic compounds which have undesirable environmental effects. To study the effects of chlorination on sewage and sewage treatment plant effluents, an investigation was conducted. This method involved combining radioactive tracer (36C1) chlorination with high-resolution chromatography. By this technique, over 40 chlorine-containing organic compounds were separated from a chlorinated primary effluent (chlorine residual 2 mg/liter) of a domestic sanitary sewage treatment plant. Secondary effluents were investigated separately, and appear to have lower concentrations of these organic constituents. Toxicity effects of the organic compounds on both microorganisms and higher organisms have yet to be determined. (Prague-FIRL)
W75-08898

STATISTICAL AIDS TO BACTERIOLOGICAL APPRAISAL OF EFFLUENTS. PART I--DIRECT COUNT METHOD,
G. v. R. Marais.
The Civil Engineer in South Africa, Vol 16, No 7, p 227-237, July, 1974. 9 fig, 6 tab, 10 ref.

Descriptors: *Statistical methods, *Sewage effluents, Bacteria, Microorganisms, Rivers, Water purification, Effluents, *Bioindicators, *Pollutant identification.
Identifiers: Poisson, Direct count method.

Bacteriological tests on sewage effluents have yielded variable results, due to both the method of determination and to the process itself. The variability must be understood in terms of statistical analysis. The two most commonly used methods for enumeration of microorganisms are the Most Probable Number method and the Direct Count method. The latter is detailed, in terms of statistical behavior. The properties of the Poisson distribution, its form, standard deviation, and the sum of two Poisson distributions are explained. Precision and accuracy of this method are examined. Observations were made as to confidence intervals. In application of the Direct Count method, both small field counts and large field counts are necessary, in order to assure a broad-based sample. In the cases where microorganisms grow in clumps, chains or clusters, a large field direct count assures the counting of the individual organisms in a given clump. Theoretical and experimental distributions for density of algal counts with clumping are given. This method has been chosen by many research engineers for use in measuring the bacteriological processes in rivers and in purification works. (Prague-FIRL)
W75-08902

RECONNAISSANCE OF THE WATER RESOURCES OF THE OKLAHOMA CITY QUADRANGLE, CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W75-08912

WATER RESOURCES OF WISCONSIN, LOWER WISCONSIN RIVER BASIN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08913

WATER RESOURCES OF HAMILTON COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08914

GROUND WATER IN GRAY COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-08915

MERCURY IN WATER, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-08934

DETAILED COST ESTIMATED FOR ADVANCED EFFLUENT DESULFURIZATION PROCESSES,
Tennessee Valley Authority, Muscle Shoals, Ala.
G. G. McGlamery, R. L. Torstrick, W. J. Broadfoot, J. P. Simpson, and L. J. Henson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 541, $11.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-600/2-75-006, January 1975. 417 p, 93 fig, 85 tab, 62 ref. 1AB013, EPA EPA IAG-134(D) Part A.

Descriptors: *Air pollution, Chemical reactions, *Economic analysis, *Capital costs, *Operating costs, Design, Fuels, Sulfur compounds.
Identifiers: Air pollution control, Scrubbing-regeneration, Limestone slurry, Lime slurry, Magnesia slurry - regeneration, Sodium solution - SO2 reduction, Catalytic oxidation, *Desulfurization.

A detailed, segmented, highly visible cost comparison of the five leading stack gas desulfurization processes was conducted. Using data available in late 1973, complete economic evaluations were prepared for limestone slurry scrubbing, lime slurry scrubbing, magnesia slurry - regeneration to sulfuric acid, sodium solution scrubbing - SO2 reduction to sulfur, and catalytic oxidation (Cat-Ox). Assuming the process technology to be proven in application, a prescribed set of representative power plant, process design, and economic premises was established. For each process design, projections are included for a base case (500-MW, 3.5% S in coal, new unit) and 16 other variations in power unit size, fuel type (coal or oil), sulfur in fuel, unit status (new vs. existing), solids disposal method (off-site vs. on-site ponding), and SO2 removal (80% vs. 90%). Capital investment, annual operating costs (7,000 hr/yr) and lifetime operating costs (overa 30-year declining operating profile) were estimated for the base case and each variation. Using sensitivity analysis, effects of variations in energy costs, raw material costs,. maintenance costs, cost of capital, operating labor cost escalation, and net sales revenue were studied. A 3-year construction schedule ending in mid-1975 is assumed for a midwestern location. Investment costs (mid-1974 dollars) can be scaled or altered to reflect any predictable project schedule, escalation rate, or location. Definition of the systems estimated, sources of cost data, and recommended equipment size-cost scale factors are given. The ranges in estimated capital cost of these processes are substantial. For example, the installed costs of the limestone slurry system were estimated to range from $23/kW to about $113/kW, depending on unit size, unit status, fuel type, sulfur content of fuel, solid disposal method, and overall project scope. Furthermore, due to high level of construction cost inflation in recent years, these estimates probably would be subject to substantial escalation for a project initiated now or in future years. (EPA)
W75-08935

SALT WATER DETECTION IN THE CIMARRON TERRACE, OKLAHOMA.
Oklahoma Water Resources Board, Oklahoma City.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 269, $7.00 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Ada, Oklahoma, Report EPA-660/3-74-033, April 1975, 166 p, 28 fig, 5 tab, 22 ref. EPA 1BA024, Grant No S-800994.

Descriptors: Groundwater, *Brines, *Oklahoma, *Resistivity, Aquifers, *Saline water, Water pollution sources, *Alluvial aquifers, *Pollutant identification.
Identifiers: Natural brines, Wenner spread, Barnes layer.

The objectives were to demonstrate the applicability of surface resistivity techniques to delineate salt water contamination in a shallow alluvial aquifer, to outline areas of salt water contamination in a valuable terrace aquifer, to permit safe future development, and to identify the sources of such contamination. Surface resistivity using the Wenner spread and both Barnes layer and apparent resistivity interpretive methods was useful in outlining areas of major water quality changes where the geologic environment was simple and the terrace composed of sand. However, where clay was present in the terrace or where the bedrock relief was large, surface resistivity was not an accurate definitive tool. Two large areas of salt water contamination were intensively studied by test drilling. In one of these areas resistivity was extensively used. Brine contamination of one of these areas was attributed to oil field brine evaporation pits while the other area was contaminated by natural brines from the underlying bedrock. The sodium-chloride ratio was used to identify the source of brines. (EPA)
W75-08936

PHARMACOKINETICS OF TOXIC ELEMENTS IN RAINBOW TROUT, I. UPTAKE, DISTRIBUTION AND CONCENTRATION OF METHYLMERCURY BY RAINBOW TROUT (SALMO GAIRDNERI) TISSUES, II. THE MECHANISM OF METHYLMERCURY TRANSPORT AND TRANSFER TO THE TISSUES OF THE RAINBOW TROUT (SALMO GAIRDNERI),
State Univ. of New York, Buffalo.
For primary bibliographic entry see Field 5C.
W75-08938

CLIMATIC MODIFICATION BY AIR POLLUTION, II: THE SAHELIAN EFFECT,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 2B.
W75-08949

ANTIMONY IN THE COASTAL MARINE ENVIRONMENT, NORTH ADRIATIC,
Institut Rudjer Boskovic, Rovinj (Yugoslavia). Center for Marine Research.
P. Strohal, D. Huljev, S. Lulic, and M. Picer.
Estuarine and Coastal Marine Science, Vol 3, No 2, p 119-123, April 1975. 3 tab, 17 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Neutron activation analysis, *Chemical properties, *Water quality, *Sea water, Marine biology, Chemical analysis, Spectroscopy, Limestones, Dolomite, Quartz, Sediments, Water pollution, Water pollution sources, Non-destructive tests, Salinity, Suspended solids, Nuclear powerplants.
Identifiers: *Antimony, *Adriatic Sea coast.

Concentration of stable antimony in the North Adriatic coastal waters was investigated by the neutron activation technique. The following concentrations were obtained: 0.31 microgram Sb/cu dm in the case of 0.45 micron filtered sea water and 45 micrograms Sb/cu dm for nonfiltered sea water, respectively. The concentrations of stable antimony in a number of North Adriatic organisms and sediments were also reported. Laboratory tracer experiments on the sorption of Sb125 by limestone, dolomite, quartz, and marine sediments were performed in order to have a better knowledge of the fate of antimony in the marine environment. The results obtained were discussed from a standpoint of pollution. (Henley-ISWS)
W75-08968

CIVIL ENGINEERING APPLICATIONS OF REMOTE SENSING,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 7B.
W75-08978

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2J.
W75-08995

SUSPENDED SOLIDS ANALYSER.
Australian Patent 453,333. Issued September 26, 1974. Offical Journal of Patents, Trade Marks and Designs, Vol 44, No 36, p 3993, September, 1974.

Descriptors: *Patents, *Suspended solids, Analytical techniques, *Pollutant identification, Measurement, Sensing.
Identifiers: Sensor devices, Power photocells.

A system for detecting and measuring the concentration of suspended solids in a liquid is described. A sensing device is adapted for submersion in a liquid containing suspended solids, and a power sources is connected with this device. The sensing device consists of a housing with a light source and several photocells; each photocell is located at a different distance from the light source and is positioned to sense only light scattered backwards from the suspended solids. Conversion means are connected with the output terminals of the photocells for taking the logarithmic ratio of the photocell output signals to provide a single output, which is linearly representative of the solids concentration. (Prague-FIRL)
W75-09064

APPENDIX - HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM QUARTERLY SUMMARY REPORT, MARCH 1, 1974 THROUGH JUNE 1, 1974.
Health and Safety Lab. (AEC), New York.
Available from the National Technical Information Service, Springfield, Va 22161 as HASL-284, Appendix, $13.60 in paper copy, $2.25 in microfiche. Report No HASL-284, Appendix, July 1974. 465 p, 4 fig, 6 tab, 7 ref.

Descriptors: *Fallout, *Radioisotopes, *Sampling, *Analysis, *Measurement, *Assay, *Assessment, Sites, Strontium, Lead, Food chains, Milk, Domestic water, Data collections, Publications, Public health.
Identifiers: Conversion factors.

Appendices, mostly tabular data, are presented for: Sr-90 and Sr-89 in Monthly Deposition at World Land Sites; Radionuclides and Lead Surface Air; Radiostrontium in Milk and Tap Water; Table of Conversion Factors; and Table of Radionuclides. (See W75-09066 thru W75-09068).
W75-09065

STRONTIUM-90 AND STRONTIUM-89 IN MONTHLY DEPOSITION AT WORLD LAND SITES.
Health and Safety Lab. (AEC), New York.
In: Report No HASL-284, Appendix, p A-1 - 332, July 1974. 2 fig, 1 tab.

Descriptors: *Monitoring, *Measurement, *Fallout, *Strontium, *Sites, Publications, Sampling, Analysis, Data collections, Data processing, Data storage and retrieval, Networks, Computers, Public health, Laboratories.

Detail fallout deposition data are given for Sr 90 and Sr 89 at 116 sampling points located in the United States and other countries. Sampling methods and analytical techniques are reported. To facilitate the accurate storage, retrieval and handling of the data generated from the monthly fallout collection network, all data have been transcribed to punched cards. The data printed out from the punched cards are presented in tables. (See also W75-09065). (Houser-ORNL)
W75-09066

RADIONUCLIDES AND LEAD IN SURFACE AIR,
Health and Safety Lab. (AEC), New York.
H. L. Volchok, L. Toonkel, and M. Schonberg.
In: Report No HASL-284, Appendix, p B-1 - 124, July 1974. 2 tab, 7 ref.

Descriptors: *Monitoring, *Measurement, *Radioactivity, *Lead, *Sites, *Aquatic environment, Data collections, Publications, Sampling, Analysis, Quality control, Gross gamma, Radiochemical analysis, Beryllium, Plutonium, Manganese, Iron, Cadmium.
Identifiers: *Surface air.

The primary objective is to study the spatial and temporal distribution of nuclear weapons debris and lead in the surface air. Other special studies of surface air contamination have been added. Many of the original Naval Research Laboratory (NRL) sites, which grouped roughly along the 80th Meridian (West), have been continued in the current program. Since 1963 a number of other sites were added to investigate the possible effects of longitude, elevation and proximity to coastlines, and from late 1965 through March 1969, samplers were placed on four Atlantic Ocean weather ships to extend the surface air study over the marine environment. The present network extends from about 76 degrees North to 90 degrees South. Sampling stations along with their coordinates and elevations are listed. (See also W75-09065). (Houser-ORNL)
W75-09067

RADIOSTRONTIUM IN MILK AND TAP WATER.
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5B.
W75-09068

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH, PART 3 ATMOSPHERIC SCIENCES.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from the National Technical Information Service, Springfield, Va 22161 as BNWL-1850, Pt 3, $7.60 in paper copy, $2.25 in microfiche. Rept No BNWL-1850 Pt 3, April 1974. 293 p, 97 fig, 45 tab, 189 ref.

Descriptors: *Atmosphere, *Precipitation(Atmospheric), *Air pollution, *Water pollution, *Radiation, *Radioactivity, Environment, Fallout, Aerosols, Human population, Winds, Storms, Dynamics, Diffusion, Turbulence, Ion transport, Ecology, Ecosystems.
Identifiers: Decontamination, Resuspension.

The Atmospheric Sciences Program is focused on atmospheric cleansing and reinsertion processes. Studies of pollutant interaction with cloud and precipitation droplets and with the earth's surface are being conducted. Accompanying them are the necessary related investigations of aerosol description and behavior, air trajectories, cloud and storm dynamics, turbulence and diffusion. The program is aimed at providing a continually improving capability to describe the transport of contaminants released from nuclear facilities which are ultimately delivered to human populations and ecological systems. Emphasis of the program is on pollutant removal and resuspension processes, but research on all aspects of the at-

mospheric transport problem, from source to receptor, is included. The report is organized in segments which deal with the various phases of the pollutants' history during transport: Characterization of Sources and Ambient Pollutants; Transport Diffusion and Turbulence; Atmospheric Transformation Processes; Removal and Resuspension Processes. The final segment, Special Studies, deals primarily with applied aspects of the research. (See W75-09070 thru W75-09076) (Houser-ORNL)
W75-09069

CHARACTERIZATION OF SOURCES AND AMBIENT POLLUTANTS.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept No BNWL-1850, Pt 3, p 1-25, April 1974. 7 fig, 12 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Surveys, *Fallout, Precipitation(Atmospheric), Aerosols, Environmental effects, Radioactivity effects, Trace elements, Analysis, Analytical techniques, Air pollution.
Identifiers: Scavenging, Resuspension.

The nature and quantity of radioactive and chemical airborne contaminants must be known before an objective assessment can be made of the consequences of these materials to the environment. Information regarding the characteristics of pollutants is mandatory for estimation of downwind concentrations of particles and gases, the significance of deposition, the probability of resuspension, and the biological significance to the receptor of interest. Several studies were undertaken in the area of sensitive methods of analysis for trace materials in the atmosphere. An array of low-level analytical methods has been employed to describe the nature and quantity of radioactive material and other contaminants airborne in particular situations. Reports in this section present the findings of this work. (See also W75-09069) (Houser-ORNL)
W75-09070

TRANSPORT, DIFFUSION, AND TURBULENCE.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 27 - 86, April 1974. 34 fig, 12 tab, 31 ref.

Descriptors: *Atmosphere, *Ion transport, *Radioactivity, *Diffusion, *Turbulence, *Model studies, Assessment, Evaluation, Analysis, Environment, Environmental effects, Planning, Cost-benefit analysis, Air pollution.
Identifiers: Deposition, Resuspension.

Modeling the physical behavior of the atmosphere and its contaminants in or near the planetary boundary layer is described. This boundary layer extends from the surface, where eddies on the order of a few centimeters transport material and energy through a layer on the order of 1 km where large eddies effect this transport. Because if is the major receptor and conveyor of energy and matter emanating at the surface, certain aspects of the planetary boundary layer must be understood in order to provide an improved basis for assessing the environmental costs of national policy or the lack of it. In the past boundary layer research focused on the lowest 10% of the layer as the logical starting point for describing the behavior of effluents near the ground and stack gases of low buoyancy. Studies of turbulence, transport, diffusion, and deposition have aimed at providing models to evaluate effects of postulated reactor accidents over relatively short downwind distances. With increased number and size of nuclear power and fuel handling facilities, it is now more important to deal with a greater number of large potential sources distributed over broader geographic areas. Concurrently an increased desire to assess low-level radiation effects is requiring more realistic atmospheric models where conservative models were adequate before. (See also W75-09069) (Houser-ORNL)
W75-09071

ATMOSPHERIC TRANSFORMATION PROCESSES.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 87 - 107, April 1974. 9 fig, 1 tab, 4 ref.

Descriptors: *Atmosphere, *Environment, *Radioactivity, Movement, *Aerosols, *Trace elements, *Gases, Tracers, Tracking techniques, Diffusion, Air pollution, Winds, Meteorology, Model studies, Aircraft.

Contaminants, once released to the atmosphere, can be altered in many ways. Gases may become adsorbed on particles and particles may coagulate. Many chemical processes occur, frequently promoted by light and catalyzed by trace substances in the air. Understanding of transformation is essential in making material balances of air pollutants and accounting for observed downwind concentrations. During the past two years the program on atmospheric transformations has proceeded essentially through three stages of development. The first began with acquisition of the Cessna 411 aircraft, where the primary task was to acquire trace gas and aerosol instrumentation and incorporate it for airborne analysis. The second stage of the program was to utilize this newly developed facility for airborne observation and to relate these observations qualitatively to atmospheric transformation phenomena. The third stage of this program - beginning at the present time - is to develop mathematical models for quantitative diagnosis and analysis of atmospheric phenomena observed using the aircraft facility. It is anticipated that subsequent comparison between transformations models and observation will result in improved models which will be useful as input to other programs - particularly those involving wet- and dry-deposition processes. (See also W75-09069) (Houser-ORNL)
W75-09072

REMOVAL AND RESUSPENSION PROCESSES - WET REMOVAL PROCESSES.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 109 - 155, April 1974. 14 fig, 4 tab, 48 ref.

Descriptors: *Precipitation(Atmospheric), *Atmosphere, Environment, *Monitoring, *Radioactivity, Fallout, Aerosols, Gases, Trace elements, Tracers, Tracking techniques, *Air pollution.
Identifiers: *Scavenging.

Washout and in-cloud scavenging are important processes by which air pollutant particles and gases are removed from the atmosphere. The primary objective of the precipitation scavenging research is to develop methods for modeling and predicting wet removal processes in the atmosphere. Several significant new findings in the precipitation scavenging program have substantially altered research emphasis. These have also resulted in a reassessment of the program. Some important findings are: (a) It has been demonstrated mathematically that field and laboratory experiments of washout using polydisperse aerosols, while suitable for determining the washout characteristics of certain well defined aerosols, are of limited value as tests of particulate washout theory; below-cloud scavenging efforts are being revised accordingly. (b) An in-cloud tracer scavenging experiment performed at Quillayute resulted in removal rates much lower than anticipated from previous results. This finding appears to indicate that inter- and intra-cloud transport is more significant to scavenging than expected previously. Consequent modifications of experiment plans are being made. (c) Substantial evidence suggests that under some conditions scavenged gases may desorb significantly subsequent to the raindrops' impact on the surface. This finding has strong implications to delivery-rate assessment and sampler design. As a result, a no-resuspension sampler is being fabricated and future tests of this effect are anticipated. (See also W75-09069) (Houser-ORNL)
W75-09073

REMOVAL AND RESUSPENSION PROCESSES - DRY DEPOSITION OF PARTICLES.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 157 - 199, April 1974. 7 fig, 3 tab, 52 ref.

Descriptors: *Radioisotopes, *Volatility, *Particle shape, *Particle size, Fallout, Diffusion, Ion transport, Environmental effect, Cooling towers, Cooling water, Ponds, Regulation, Air pollution.
Identifiers: Deposition, Decontamination, Resuspension.

An important mechanism by which an atmosphere is depleted of particulate material is by gravity settling and by turbulent eddy diffusion processes. Historically research has been directed to deposition studies with monodisperse particles, first in tubes transporting particles, then in wind tunnel studies. Some field studies were undertaken much earlier to determine by mass balance the depletion of particles from a plume. Recent work in the wind tunnel has shown the relationship of deposition velocity to particulate size, average velocity, friction velocity, and the unique characteristics of surfaces. Models have been developed which take into account these variables, and a large body of data has been made available. Wind tunnel studies are to be implemented with field studies using well characterized aerosols. The studies in 1973 were concerned with deposition to crushed rock surfaces, shallow water, and vegetation canopies. Ongoing field studies have utilized comparisons of depositing with nondepositing tracers for evaluating deposition. This technique as well as direct turbulent flux measurements of pollutants should provide expanded capability for future investigation of deposition over larger regions and onto varied surfaces of wider range of interest. (See also W75-09069) (Houser-ORNL)
W75-09074

REMOVAL AND RESUSPENSION PROCESSES - RESUSPENSION OF PARTICLES.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 201 - 233, April 1974. 10 fig, 10 tab, 22 ref.

Descriptors: *Atmosphere, *Environment, *Radioactivity, *Particle size, *Particle shape, Aerosol, *Air pollution, Soil contamination, Air movement, Winds, Sands, Radioisotopes, Ion transport.
Identifiers: Deposition, Decontamination, Resuspension.

Particles, once airborne and deposited, can again become airborne when wind stresses are sufficiently high. Research in this area is undertaken to help establish the important variables and their interrelationships. The ultimate use for data of this kind is to determine the exposure to man from such secondary sources and to set permissible limits on ground contamination. An important variable is the wind speed, but the interaction between the primary particle of interest and the bulk soil particles is also very important. Areas contaminated inadvertently with radioisotopes from various processes are being used; but also initial studies using a tracer placed on an instrumented plot of prairie-like terrain were performed.

An important part of this work is to develop models which account for particles resuspended and deposited. Diffusion and dispersion in the atmosphere, once particles are resuspended, are important in diluting the airborne material; hence, this work interfaces directly with diffusion studies. The physics of wind blown sand and fine particles is also studied to determine the mechanisms of resuspension and transport. Studies on the nature and release of radioactive particle in local Hanford project areas during fires are also described. (See also W75-09069) (Houser-ORNL)
W75-09075

SPECIAL STUDIES - COOLING TOWER RESEARCH - BIOMETEOROLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
In: Rept. No. BNWL-1850, Pt. 3, p 235 - 270, April 1974. 16 fig, 3 tab, 26 ref.

Descriptors: *Cooling towers, *Effluents, *Chromium, *Measurement, *Nuclear powerplants, *Thermal pollution, Water quality, Water quality control, Assessment, Environmental effects, Micrometeorology, Meteorology, Model studies, Ecology, Ecosystems, Climatology.

The number of cooling towers being constructed in the U.S. is rapidly increasing due to the expansion of electrical generating capacity demand, water quality thermal limits, and competition for fresh water resources. In addition, the localization of electrical demand in coastal areas is encouraging wide utilization of salt water cooling towers. With this trend and the trend for progressively larger power plants on the same site, immediate attention must be given to establishing the basic information necessary to assess the impact of such actions. The data base available for predicting salt water cooling drift amounts and the potential for inadvertent weather modification is meager and far behind plans for future development. It was with this background that cooling tower studies were initiated. In the first year, emphasis has been placed upon both theoretical and experimental studies of drift modeling and scoping the effects of waste heat releases to the atmosphere. The results to date and the trends in utility developments have not only confirmed and reinforced the initial motivation for these investigations, but have injected a sense of urgency to such research if the scientific community is to keep pace with the requirements for its product. Cooling tower studies will continue to address the need for drift models, and increased emphasis will be placed on obtaining cooling tower plume data and evaluating potential effects on weather from multi-unit reactor sites. (See also W75-09069) (Houser-ORNL)
W75-09076

STOCHASTIC VARIATION OF WATER QUALITY OF THE PASSAIC RIVER,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering.
B. M. Mehta, R. C. Ahlert, and S. L. Yu.
Water Resources Research, Vol 11, No 2, p 300-308, April 1975. 2 fig, 12 tab, 10 ref. OWRT A-035-NJ(4).

Descriptors: *Water quality control, *Stochastic processes, *Time series analysis, *Simulation analysis, Streamflow, Water temperature, Biochemical oxygen demand, Dissolved oxygen, Fluctuations, Discharge(Water), Rainfall, Mathematical models, Equations, Systems analysis, *New Jersey.
Identifiers: *Passaic River(NJ), Arima models, Prediction, Oxygen regime, Oxygen deficit, Daily.

Most receiving water quality models are steady state, deterministic, one-dimensional structures. Yet it is clear that stream quality varies in time and is non-deterministic; receiving water quality is a stochastic variable. A rational approach to the problem is to consider stochastic variation as an important aspect of water quality and to incorporate some form of this concept into water quality standards. In addition to aiding the development of manageable standards, stochastic modeling is especially important to successful quality forecasting. The stochastic structures of some water quality times series are examined. These time series include daily observations in streamflow, water temperature, BOD, and dissolved oxygen deficit. Autoregressive integrated moving average (Arima) models have been used to describe the random components of these time series. Except for the BOD, the Arima models provide very satisfactory results. (Bell-Cornell)
W75-09080

PHYTOPLANKTON DISTRIBUTION AND WATER QUALITY INDICES FOR LAKE MEAD (COLORADO RIVER),
Arizona Univ., Tucson. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-09083

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND NATURAL WATERS, (PHASE II OF) A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
M. R. Querry, W. C. Holland, R. C. Waring, and G. M. Hale.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 123, $4.75 in paper copy, $2.25 in microfiche. Missouri Water Resource Research Center Completion Report, March 31, 1975. 84 p, 12 fig, 8 ref, 3 append. OWRT A-058-MO(4). 14-31-0001-4025.

Descriptors: Measurement, Optical properties, Sulfates, Ion compounds, *Spectroscopy, Absorption, *Chlorophyll, *Lasers, Aqueous solutions, Feasibility studies, Non-destructive tests, Analytical techniques, *Chemical analysis, *Pollutant identification.
Identifiers: *Absorption spectroscopy, Ferrous sulfate.

Investigations conducted have shown that the quantity of both chlorophyll types a and b can be nondestructively measured in solution by use of laser enhanced absorption spectroscopy (LEAS) at 1/100 the concentration easily detectable by use of ordinary spectrophotometric methods; this is a 100 times increase in sensitivity. It is estimated with considerable confidence that the ultimate sensitivity for the LEAS technique is 10,000 times greater than that for ordinary spectrophotometric methods. During the first phase (1 July 1972 - 30 June 1973) narrow-band dye-laser enhanced absorption was measured. (See W74-01658). During the second phase of the project (1 July 1974 - 31 December 1974) preparations were made on laboratory apparatus to measure broad-band dye-laser enhanced absorption spectra of chlorophyll. The optical properties of water were also investigated in the spectral region 200 micrometer.
W75-09125

PORTABLE DEVICE FOR THE QUANTITATIVE DETERMINATION OF TRACE ELEMENTS IN WATER IN THE SUB-NANO GRAM SENSITIVITY RANGE,
Missouri Univ., St. Louis. Dept. of Physics.
C. C. Foster, and R. Hight.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 132, $5.25 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center Completion Report, April 18, 1975. 75 p, 29 fig, 7 tab, 55 ref, 2 append. OWRT A-064-MO(2). 14-31-0001-3825 and 4025.

Descriptors: Radioisotopes, *X-ray fluorescence, *Trace elements, *Pollutant identification, Water analysis, Analytical techniques, *Radiochemical analysis, *X-ray analysis.

Alpha particles and protons from charged particle accelerators and photons from both x-ray tubes and radioactive sources have been shown to be useful for the excitation of characteristic x-rays for multi-element energy dispersive trace analysis of environmental samples to the few ppm range. The use of 4.5 MeV alpha particles from a thin window Po-210 source (tl/2=138.4d) of 5 mCi effective strength to directly excite x-rays from trace elements in 1 cc water samples evaporated on 1.75mg/sq cm thick mylar backings in a helium atmosphere in a lucite enclosure was investigated. Minimum detectable amounts (MDA's) were established for 20 elements ($22<Z<82$) using K-, L- and M- radiation and 50 minute counting times. The smallest MDA determined was 0.14 microgram for Vanadium. Other representative MDA's, in microgram, are Fe-0.57, Mo- 0.33 and Pb - 0.5. Radioalpha induced x-ray trace element analysis offers the same advantages of portability, ease of operation, low maintenance and cost, and 'in house' availability as radiophoton induced analysis. Because of the availability of more intense sources (up to 10 Ci), the fact that the detected radiation (x-rays) differs from the excitation radiation (alpha-particles) and that K, L, and M x-ray emission cross sections depend essentially only on the emitted x-ray energy, lower MDA's are obtainable for many elements in thin samples for comparable counting times, as well.
W75-09126

PREDICTION OF WATER SOLUBLE ARSENIC IN SEWAGE-SOIL SYSTEMS,
Missouri Univ., Columbia. Dept. of Agronomy.
R. Hess, and R. Blanchar.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 127, $9.25 in paper copy, $2.25 in microfiche. Missouri Water Resources Center Completion Report, June 1, 1975. 287 p, 46 fig, 86 tab, append. OWRT A-068-MO(1). 14-31-0001-4025 and 5025.

Descriptors: *Arsenic compounds, *Soil chemistry, Soil water, Oxidation, Reduction(Chemical), Aeration, Sewage, *Missouri, Land use, *Soil contamination, *Loam, Soil analysis, *Soil chemical properties, Lead, *Oxidation-reduction potential, Pollutant identification.

Fifteen g samples of Sharpsburg silty clay loam and a Menfro silt loam soil containing 320 and 160 ug As/g, respectively, were equilibrated for 21 days with 30 ml of distilled water or 1% dextrose. After 21 days the samples were freeze dried, divided into 2 groups, one air dry and the other at 26.7% water and exposed to the atmosphere. Eh, pH, As, Fe, Al, Mn, Ca and Pb in solution were determined periodically. After an initial Eh drop in the 1% dextrose equilibration, the As in solution increased rapidly in both soils, but was constant after 12 days. The As in solution increased more slowly in the water equilibration, but also remained constant after 12 days. At 4 days after freeze drying the As level was near the level observed before reduction. Both soils were equilibrated with dilute HCl and NaOH for 7 days at 25 degrees at values of pAl + 3pOH, pAl + pAsO sub 4, pFe + 3pOH, pFe + pAsO sub 4, 3pMn + 2pAsO sub 4, 3pCa + 2pAsO sub 4 and 3pPb + 2pAsO sub 4, computed and compared to those of synthesized arsenates. Both soils were undersaturated with respect to aluminum, ferric, and calcium arsenates, and near equilibrium concentrations of As predicted from lead and manganese arsenates.
W75-09127

HYDRO-GEOCHEMISTRY IN A CARBONATE BASIN - GEOMORPHIC AND ENVIRONMENTAL IMPLICATION,
Vanderbilt Univ., Nashville, Tenn. Dept. of Geology.
For primary bibliographic entry see Field 2K.
W75-09129

IDENTIFICATION, ANALYSIS AND REMOVAL OF GEOSMIN FROM MUDDY-FLAVORED TROUT,
Fisheries research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
M. Yurkowski, and J. L. Tabachek.
Journal of the Fisheries Research Board of Canada, Vol 31, No 12, p 1851-1858, December, 1974. 3 fig, 1 tab, 28 ref.

Descriptors: *Organoleptic properties, Taste, *Saline lakes, *Chemical analysis, *Rainbow trout, Analytical techniques, Mass spectrometry, Gas chromatography, Saline water, Commercial fish, Canada, Isolation, *Pollutant identification, Water pollution effects.
Identifiers: *Geosmin, *Taste threshold, Streptomyces.

Geosmin has been isolated and identified, using gas chromatographic, mass-spectrometric, and organoleptic analysis, as the principal compound responsible for the muddy flavor in fish from various saline lakes in Western Canada. A method for quantitative estimation of geosmin has been described and evaluated. Placing of muddy-flavored rainbow trout (Salmo gairdneri) in clean water resulted in reduction of flavor to the borderline level between 3 and 5 days, and of geosmin concentration from 1.1 to 0.3 micrograms/100 g of flesh in 14 days. The taste threshold level of geosmin was estimated to be 0.6 micrograms/100 g flesh. (Katz)
W75-09135

A TECHNIQUE TO PROLONG THE INCUBATION PERIOD OF BROWN TROUT OVA,
Imperial Chemical Industries Ltd., Brixham (England). Brixham Research Lab.
B. G. Maddock.
The Progressive Fish-Culturist, Vol 36, No 4, p 219-222, October 1974. 2 fig, 4 ref.

Descriptors: *Brown trout, Fish eggs, *Salmonids, *Fish reproduction, *Water cooling, Temperature, Temperature control, *Water temperature, *Incubation, Structural design, Bioassay, Spawning, Fry, Life cycles, Fish physiology, Fish diets, Nutrient requirements, Hatching, Water quality, Dissolved oxygen, Construction, Construction costs, Reservoirs, Carbon filters, Centrifugal pumps, Fungi, Infection, Laboratory tests.
Identifiers: *Ova, Recirculation systems.

To maintain continuity of bioassay experiments on brown trout, a temperature controlled recirculation system has been devised to prolong the incubation period of brown trout ova. The technique has extended the normal availability period of brown trout fry from 4 months to 8 months. The recirculation culture unit described proved 90-95 % successful in hatching salmonids and suggests suitability for other freshwater species. (Katz)
W75-09138

PRESENCE OF LIPID-SOLUBLE CHLORINATED HYDROCARBONS IN MARINE OILS,
Central Inst. for Industrial Research, Oslo (Norway).
G. Lunde, and A. E. Steinnes.
Environmental Science and Technology, Vol 9, No 2, p 155-157, February 1975. 1 fig, 2 tab, 13 ref.

Descriptors: *Chlorine, *Chlorinated hydrocarbon pesticides, *Organic compounds, *Lipids, Food webs, Bromine, Fish, Shrimp, Commerical fish, Halogens, Path of pollutants, Water pollution sources, *Pollutant identification.
Identifiers: *Commercial marine oils, Bioaccumulation, Fish oils, Whale oil.

The total amount of chlorine present as lipid-soluble chlorinated hydrocarbons is determined in marine oils from fish, shrimp and whale. The oils are isolated by heat treatment and also by extraction with suitable organic solvents. The level of chlorine varies from about 20-650 ppm in the samples investigated. The larger part of this lipid-soluble organic-bound chlorine can hardly be accounted for by known substances. They may in part be synthesized by natural means in the marine environment. The absorption of unidentified chlorinated pollutants is another possible source. Bromine and iodine have also been determined to allow comparison with previously obtained data. (Katz)
W75-09147

ACCUMULATION OF 3,4,3',4'-TETRACHLOROBIPHENYL AND 2,4,5,2',4',5'- AND 2,4,6,2',4',6' - HEXACHLOROBIPHENYL IN JUVENILE COHO SALMON,
National Marine Fisheries Service, Seattle, Wash.
E. H. Gruger, Jr., N. L. Karrick, A. I. Davidson, and C. T. Hruby.
Environmental Science and Technology, Vol 9, No 2, p 121-127, February 1975. 5 tab, 27 ref.

Descriptors: *Salmon, *Polychlorinated biphenyls, *Growth rates, *Bioassay, Chlorinated hydrocarbon pesticides, Stress, Laboratory tests, Food chains, Analysis, Analytical technique, *Absorption, Water pollution effects, *Pollutant identification.
Identifiers: *Bioaccumulation, Oncorhynchus kisutch, Chlorobiphenyls, *Coho salmon.

Coho salmon parr were fed 10 micrograms of equal proportions of 3,4,3',4'-tetrachlorobiphenyl, 2,4,5,2',5'-hexachlorobiphenyl, and 2,4,6,2',4',6'-hexachlorobiphenyl per gram of food pellets. Analyses at various time intervals indicated that significant differences in accumulated body concentrations of the chlorobiphenyls occurred only after 108 days of feeding. At this time, three fish averaged 1.4 plus or minus 0.35 micrograms of each hexachlorobiphenyl and 0.65 plus or minus 0.32 micrograms of the tetrachlorbiphenyl per gram wet whole body tissues. Analyses before and after a final 48 days of starvation showed different concentrations for the tetrachlorobiphenyl compared to the hexachlorobiphenyls in various tissues. Before starvation, concentrations of the tetrachlorobiphenyl ranged from a low of 0.09 micrograms/g wet white muscle to a high of 10.8 micrograms/g wet adipose tissues; concentrations of hexachlorobiphenyls were about twice as high. After starvation concentrations of the hexachlorobiphenyls were three to four times greater than the those of the tetrachlorobiphenyls. (Katz)
W75-09148

BIOASSAY METHODS OF THE NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD,
National Swedish Environment Protection Board, Stockholm. Research Lab.
T. B. Hasselrot.
Journal Water Pollution Control Federation, Vol 47, No 4, p 851-857, April 1975. 12 ref.

Descriptors: *On-site investigations, *Bioassay, *Bioindicators, *Testing procedures, *Pollutant identification, Water pollution effects, Water pollution control, Toxicants, Tagging, Industrial wastes, Water waste treatment, Organoleptic properties, *Pulp wastes, Cellulose, Fish eggs.
Identifiers: *Salmo spp., Bioaccumulation, Dimethyl sulfide.

The bioassay methods used by the research laboratory of the National Swedish Environment Protection Board for testing toxicants and polluted waters from industries and communities are described. Field investigations are the main task of the research laboratory. To study toxicological and accumulative effects of water pollution, cages containing fish and bivalves have been stationed in lakes, water courses and coastal waters. The purpose was to follow the effect of a known source of water pollution or to trace an unknown one. Results of the cage investigations are presented. Also, free-swimming fish have been tagged to compare the concentration of a certain water pollutant in these fish and in the caged specimens. Biotests at industries and wastewater treatment plants determine the toxicological and cumulative effects of polluted water so that action may be taken at an early stage to prevent fish death in the receiving water. (Katz)
W75-09155

OIL SPILL PROTECTION IN THE BALTIC SEA,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
For primary bibliographic entry see Field 5G.
W75-09156

A FILTER AND CHILLER FOR AN OPEN SEA-WATER SYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 7B.
W75-09158

CONTAMINATION BY 51CR AND 109CD OF CULTURES OF THE ALGA DUNALIELLA BIOCULATA (CONTAMINATION PAR LE 51CR ET LE 109CD DE CULTURES DE L'ALGUE DUNALIELLA BIOCULATA), (IN FRENCH),
Institut Oceanographique, Paris (France).
M. C. Saraiva, and A. Fraizier.
Marine Biology, Vol 29, No 4, p 343-350, 1975. 6 fig, 9 tab, 16 ref. English abstract.

Descriptors: *Metals, *Absorption, *Algae, *Chromium, Cadmium, *Cadmium radioisotopes, Radioisotopes, Analytical techniques, Bioassay, *Pollutant identification, Water pollution effects.
Identifiers: *Dunaliella bioculata, Uptake mechanisms, Bioaccumulation.

Contamination of Dunaliella bioculata by 51Cr and 109Cd was observed experimentally to determine the possible uptake mechanisms of the metals by this alga. Despite slight contamination by 51Cr, it was not possible to demonstrate any active mode of absorption of the radionuclide. In the case of 109Cr, however, the various tests revealed that uptake did occur, the concentration factor being about 300 for a contact time of 15 days. (Katz)
W75-09160

DISCHARGE MEASUREMENTS AND CHEMICAL ANALYSES OF WATER IN NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 7C.
W75-09172

WATER RESOURCES DATA FOR KANSAS, 1974: PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 7C.
W75-09181

DETERMINATION OF TRACE ELEMENTS IN WATER AND AQUATIC BIOTA BY NEUTRON ACTIVATION ANALYSIS,
Geological Survey, Denver, Colo.
L. L. Thatcher, and J. O. Johnson.
In: Bioassay Techniques and Environmental Chemistry: Ann Arbor Science Publishers, Inc, Ann Arbor, Mich, p 277-298, 1973. 3 fig, 5 tab, 9 ref.

Descriptors: *Trace elements, *Neutron activation analysis, *Pollutant identification, Water analysis, Chemical analysis, Sampling.

Advantages offered by neutron activation for water pollution analysis include positive identifi-

cation of elements, high sensitivity, elimination of contamination from reagents, and minimization of exchange between the water sample and container. Contamination is minimized by use of a special sampling procedure using a pre-analyzed polyethylene bag. Quartz ampoules are also used. Both containers eliminate transfer of sample prior to irradiation. Mercury is determined by a post-irradiation carrier precipitation. Fourteen other elements are determined by a post-irradiation mixed carrier hydroxide-sulfide precipitation. Rare earths have been detected in many water samples. Even with radiochemistry, it is essential to use a high resolution lithium-drifted germanium detector to eliminate rare earth interference. The principal disadvantage of the method is failure to determine lead. (Knapp-USGS)
W75-09182

GROUND-WATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 6D.
W75-09185

LENGTH OF INCUBATION FOR ENUMERATING NITRIFYING BACTERIA PRESENT IN VARIOUS ENVIRONMENTS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
V. A. Matulewich, P. F. Strom, and M. S. Finstein.
Applied Microbiology, Vol 29, No 2, p 265-268, February 1975. 2 tab, 18 ref. OWRT A-030-NJ(4), 14-01-0001-3230.

Descriptors: *Nitrification, Water pollution effects, *New Jersey, *Incubation, Bacteria, *Pollutant identification.
Identifiers: *Nitrosomonas, *Nitrobacter, *Nitrifying bacteria, Microbial ecology, Passaic River(NJ), Mine Brook(NJ).

The effect of incubation time on most-probable-number (MPN) estimates of autotrophic nitrifying bacteria was investigated using water, rooted aquatic plants, muds, and slimes as inoculum sources. Maximum MPNs of the NH sub 4 + -oxidizing group were attained in 20 to 55 days (median, 25). Estimates of NO sub -2 -oxidizers were highest at termination (103-113 days). (Whipple-Rutgers)
W75-09234

THE USE OF PHYSIOLOGICAL INDICATORS OF STRESS IN MARINE INVERTEBRATES AS A TOOL FOR MARINE POLLUTION MONITORING,
Virginia Inst. of Marine Science, Gloucester Point.
M. P. Lynch.
In: Marine Technology Society Tenth Annual Conference Proceedings, (1974), p 881-890, Contribution No. 625 of the Virginia Institute of Marine Science. 4 fig, 4 tab, 17 ref.

Descriptors: Water pollution effects, Water pollution sources, *Crabs, *Pesticide residues, Pollutants, Aquatic environments, Marine animals, Red tide, DDT, Thermal stress, *Monitoring, *Bioindicators, *Pollutant identification.
Identifiers: *Blue crab(Callinectes sapidus), *Glucose, Synergistic effects, Ionic composition, Physiological criteria, Ninhydrin positive substances, Osmotic concentration, Sea Grant Program.

Present techniques for monitoring pollution in aquatic environments rely heavily upon measuring the concentration of a given pollutant. In marine environments, because of the possibility of synergistic effects brought about by the ionic composition of the medium, physiological criteria would be a much more sensitive measure of pollution effects than a determination of the pollutant itself. Selected serum constituents of the blue crab, Callinectes sapidus, subjected to natural stresses (red tide and holding) and pollution related stresses (DDT and thermal shock) were compared to 'baseline' concentrations of the same constituents in crabs from unstressed environments. Glucose in new year class females and serum protein in both males and females were higher in red tide stressed crabs. Protein and total osmotic concentration were lower in DDT stressed crabs. Thermal stress resulted in higher total ninhydrin positive substances, total osmotic concentration and glucose and lower chloride in female crabs. Comparing serum constituents of animals offers promise as a tool for assessing the effects of pollutants on marine animals and for monitoring pollution effects in natural environments. (NOAA)
W75-09269

IGOSS MARINE POLLUTION MONITORING PILOT PROJECT,
National Oceanic and Atmospheric Administration, Rockville, Md.
R. A. Zachariason.
Mariners Weather Log, Vol 18, No 6, p 370-373, November 1974. 4 fig, 1 tab, 3 ref.

Descriptors: *Oil spills, *Oil pollution, *Monitoring, *Oecans, Pollutants, Flotsam, Plastics, Environmental control, Beaches, Organic compounds, Pollutant identification.
Identifiers: *Monitoring pollution, *Marine pollution, Oil slicks, Ocean environments, Tar balls, Floating particulates, Global scale, *Petroleum hydrocarbons.

A worldwide system for monitoring petroleum in the oceans is scheduled to begin in January 1975. This Pilot Project is aimed toward the development of organizational machinery and experience needed in the formulation of any coordinated exercise on marine pollution monitoring. The selected vehicle for the project is petroleum-derived oils, since currently they are being monitored to some degree by various national authorities and within several regional frameworks. The following pollutant types will be included: (1) Oil slicks and other floating pollutants; (2) Floating particulate petroleum residues or 'tar balls'; (3) Tar on beaches; and (4) Dissolved/dispersed petroleum hydrocarbons in the surface waters (1 m; additional depths are optional) of the ocean. The basic components of the Pilot Project are outlined. (NOAA)
W75-09280

IN SITU COLOUR MEASUREMENTS ON THE GREAT LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
K. P. B. Thomson, and J. Jerome.
Scientific Series, No 51, 8 p, 1975. 3 fig, 5 tab, 10 ref.

Descriptors: *Color, *Productivity, Lake Ontario, Algae, Lake Superior, Sediment load, Effluents, Upwelling, Limnology, Measurements, Analytical techniques, Water analysis, Optical properties.
Identifiers: Spectral irradiance, Downwelling.

Measurement of upwelling and downwelling spectral irradiance have been used to compute in situ color for Lakes Ontario and Superior. The computations of the color are based on the CIE (Committee on Colorimetry, 1953) chromaticity system. Tristimulus values for a network of stations and a number of different time periods are analysed with reference to limnological parameters. The analysis shows that suspended inorganic material and biological activity affect the in situ color in characteristic ways. In effect, three principal water regimes can be identified by their characteristic or dominant wavelength. These are clear water with little dissolved or suspended substances, water that is biologically productive, and water with heavy sediment loading. The in situ color also indicates basic differences between the two lakes that are related to their productivity. (Envir-Canada)
W75-09294

INTERLABORATORY QUALITY CONTROL STUDY NO 9, COPPER, CADMIUM, ALUMINUM, STRONTIUM AND MERCURY,
Canada Centre for Inland Waters, Burlington (Ontario).
D. J. McGirr, and R. W. Wales.
Report Series No 34, 13 p, 1975. 10 tab, 16 ref, 1 append.

Descriptors: *Cations, *Water analysis, *Trace elements, Water quality, Cadmium, Copper, Aluminum, Strontium, Mercury, Water pollution, Methodology.
Identifiers: *Atomic absorption, Manual methods, Precision, metals.

Twenty-six laboratories participated in a quality control study on the determination of copper, cadmium, aluminum, strontium and mercury in water. Copper and cadmium are determined frequently by most participants in this study, and results for these two metals were satisfactory as for a previous study using standard atomic absorption techniques. Precision for aluminum was fair, with a non-zero blank reading, likely picked up from the glassware. Most participants determine aluminum rarely; some had switched methods recently. Satisfactory results for strontium were obtained by seven laboratories using atomic absorption and by five laboratories using flame emission spectroscopy. The automated method used by the Water Quality Branch (WQB) demonstrated greatly improved precision and accuracy for mercury compared to a previous study, whereas the variety of manual methods used produced many outliers. (Envir-Canada)
W75-09295

INTERLABORATORY QUALITY CONTROL STUDY NO 10, TURBUDITY AND FILTERABLE AND NONFILTERABLE RESIDUE,
Canada Centre for Inland Waters, Burlington (Ontario).
D. J. McGirr.
Report Series No 37, 10 p. 4 fig, 6 tab, 14 ref.

Descriptors: *Turbidity, *Residues, Suspended load, Suspended solids, Water quality, Water analysis, Sewage, Sludge.
Identifiers: Nonfilterable residue, Filterable residue.

The turbidity and filterable and nonfilterable residue determinations were evaluated by means of an interlaboratory study and by additional studies on storage stability and reproducibility conducted at the Canada Centre for Inland Waters. Although none of these tests can be considered very precise, reasonably useful data can be obtained from the use of the appropriate test under carefully controlled conditions. Turbudity measured by the turbidimeter is shown to be the most precise measurement of suspended matter at the levels normally encountered in natural waters, and it is the preferred test if the analysis is done immediately. The most serious problem affecting turbidity measurements is limited storage stability. In the case of samples which have to be shipped to the laboratory, the negative bias generally introduced by storage instability can be at least partly overcome by shaking the samples very vigorously before the determination. Preservatives such as mercuric chloride are of no value. Nonfilterable residue is less affected by storage instability but is less precise than turbidity at all levels tested and has a detection limit of the order of 2 mg/l assuming that a sample of 100 ml to 250 ml is used. Although the fixed filterable residue and fixed nonfilterable residue determinations may be useful for sewage and sludge samples, they contributed little useful additional information for natural waters. It is suggested that they could be eliminated from Water Quality Branch (WQB) tests. (Envir-Canada)
W75-09296

AN ANALYSIS OF THE DYNAMICS OF DDT IN MARINE SEDIMENTS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 5B.
W75-09300

ASBESTOS IN POTABLE WATER SUPPLIES,
Johns-Manville Sales Corp., Denver, Colo. Public Water Pipe Div.
H. L. Olson.
Journal of the American Water Works Association, Vol 66, No 9, p 515-518, September 1974. 8 fig.

Descriptors: *Asbestos cement, *Pipes, Water quality, *Public health, Pipelines, Construction materials, *Asbestos, Distributions systems, Water distribution(Applied), *Pollutant identification, *Path of pollutants, Water pollution sources, Potable water.
Identifiers: *Gastrointestinal cancer.

Currently an estimated 1.5 million miles of asbestos-cement pipes are used for water distribution; more than 200,000 miles are in the United States. The question has arisen as to whether the asbestos fibers in water supplies might be related to the risk of gastrointestinal (GI) cancer. A research project was conducted which reviewed available literature and statistics, developed techniques to measure the amount of asbestos fibers in water, used a new technique that employed an electron microscope, and studied two cities to check the asbestos in water samples over an extended period of time. The following conclusions were reached: the incidence of GI cancer has decreased during the same period of time in which asbestos-cement sales have increased; the water flowing through asbestos-cement pipe picks up very little asbestos; many source waters contain more asbestos fiber than does water that flows from asbestos-cement pipes; under conditions in which the maximum asbestos-fiber content in water was observed, the total amount of asbestos that would be ingested by a person during a 70 year life span would be 0.077 gram; and, the consumer benefits from the purchase of asbestos-cement water pipe. (Orr-FIRL)
W75-09302

METHOD AND APPARATUS FOR ANALYZING ORGANIC CARBON IN AQUEOUS SYSTEMS,
Aerochem Research Labs., Inc., Princeton, N.J. (Assignee).
W. J. Miller, and H. F. Calcote.
United States Patent 3,814,583. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 923, No 1, p 242, June 1974. 1 fig.

Descriptors: *Patents, Aqueous solutions, *Carbon, Equipment, *Ionization, *Ion exchange, Metals, Organic compounds, *Pollutant identification, Water analysis.
Identifiers: Flame ionization unit, Ionized carbon compounds, *Organic carbon.

Organic carbon in an aqueous medium is burned and detected in a flame ionization unit. The water under analysis is atomized to a fine spray. The fine water spray travels into the combustion zone of a hydrogen flame where the organic carbon compounds are ionized. A collection electrode connected to an electronic circuit detects the ionized carbon compounds. Ion exchangers remove inorganic matter, for example, alkali metal salts, from salt-containing water, which could interfere with the analyzing process. (Leibowitz-FIRL)
W75-09303

ENVIRONMENT MONITORING DEVICE AND SYSTEM,
Texas Instruments, Inc., Dallas. (Assignee).
P. F. Cox.
United States Patent 3,831,432. Issued August 27, 1974, Official Gazette of the United States Patent Office, Vol 925, No 4, p 1153, August 1974. 1 fig.

Descriptors: *Patents, *Monitoring, Control systems, Equipment, Environmental control, Adsorption, *Pollutant identification.
Identifiers: Sensors.

A monitoring system for determining the presence and concentration of selected substances in an environment includes a set of sensors providing outputs responsive to substances adsorbed from the environment. One of the sensors has a output differing from the others in the set in its response to at least one monitored substance. The sensors consist of adsorption field effect transistors respectively having chemically specific films in the gate region for the capability of preferential adsorption of preselected substances. (Leibowitz-FIRL)
W75-09305

EXHAUSTIVE ELECTROLYSIS METHOD FOR DETERMINATION OF OXYGEN DEMAND,
Honeywell, Inc., Minneapolis, Minn. (assignee).
J. P. Cummings.
United States Patent 3,857,761. Issued December 31, 1974. Official Gazette of the United States Patent Office, Vol 929, No 5, p 2044, December, 1974. 1 fig.

Descriptors: *Patents, *Electrolysis, Cathodes, Anodes, Analytical techniques, Samples, Liquids, Membranes, *Oxygen demand, *Pollutant identification.

An exhaustive electrolysis method for determination of oxygen demand consists of placing an aqueous sample into an electrolytic cell having a pair of electrodes in contact with the sample. This includes an anode within an anode compartment, a cathode remote from the anode compartment, and an ion permeable membrane in contact with the sample to provide an electrolytic bridge between the anode and the cathode. An alkali metal hydroxide is added to the sample until the pH of the sample is greater than ten. An electrolyzing current is then applied across the electrodes at a potential suitable for the generation of oxygen along the sample contacting surface of the anode, until the sample is electro-inactive and maintains a substantially constant temperature. Finally, measurement is made of the partial pressure of oxygen evolved from the anode-sample interface during the period when the sample is substantially electro-inactive. (Prague-FIRL)
W75-09311

MEASURE EFFLUENT COD WITH RAPID PERMANGANATE TEST,
Saskatchewan Univ., Saskatoon.
M. S. Nasr, and D. G. MacDonald.
Pulp and Paper Canada, Vol 76, No 3, p 91-93, (T87-89), March 1975. 4 fig, 11 ref.

Descriptors: *Bleaching wastes, *Chemical oxygen demand, *Pulp wastes, *Indicators, Industrial wastes, Wastes, Water pollution sources, Chemical analysis, Effluents, Water pollution, Water pollution control, Alkalinity, Catalysts, Oxidation, Canada, *Pollutant identification.
Identifiers: *Permanganate number, Alkaline extraction, Dichromates, Manganese sulfate.

The permanganate number method used to determine the relative hardness (lignin content) of pulp can be modified to determine the COD of effluents produced by the pulpaper industry. The test takes about 10 min to complete, and the results can be reported as a Permanganate Value (PV) or as ppm of COD if a correlation with the standard dichromate method is established. Effluent from the caustic extraction stage of a bleach plant was used to study the parameters affecting the permanganate method, and modifications were made. More sulfuric acid than is normally used was added because of the alkalinity of the effluent, and manganese sulfate was added to catalyze the reaction. This study showed a typical correlation between the permanganate number and the COD for the caustic extraction effluent. When the COD of the effluent is changed by dilution, a straight-line relationship through the origin exists. COD changes due to treatment of the effluent (e.g., lime treatment) results in a straightline relationship, but with the COD non-zero when the PV is zero, because the permanganate does not oxidize all of the organic compounds that the dichromate does. For this reason, it is necessary to correlate the PV with the dichromate method for each application. Once the correlation is established, the permanganate method is a simpler and faster method of measuring COD. (Sykes-IPC)
W75-09344

5B. Sources Of Pollution

SOME FACTORS AFFECTING THE SURVIVAL OF COLIFORM BACTERIA IN SEAWATER (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science Technology.
For primary bibliographic entry see Field 5C.
W75-08884

OCCURRENCE AND DETERMINATION OF INORGANIC POLLUTING AGENTS (IN GERMAN),
Munich Univ. (West Germany). Institut fuer Wasserchemie und Chemische Balneologie.
For primary bibliographic entry see Field 5A.
W75-08888

METALS AND METALLOIDS IN WATER: THEIR IMPORTANCE TO MAN (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
For primary bibliographic entry see Field 5G.
W75-08890

WASTEWATER INFILTRATION NEAR THE CITY OF MOUNT SHASTA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
G. L. Bertoldi.
Water-Resources Investigations 20-73, September 1973. 31 p, 7 fig, 6 tab, 5 ref, 2 append.

Descriptors: *Water pollution sources, *Sewage effluents, *Waste water disposal, Ponds, *Infiltration rates, Groundwater, Hydrogeology, *Path of pollutants, Seepage, Soil physical properties, Glacial aquifers, Water table, Groundwater movement, *California.
Identifiers: Mount Shasta(Calif), Lake Siskiyou area, Upper Sacramento River, Box Canyon Dam.

Disposal of waste discharged from the city of Mount Shasta, Calif., is by use of sewage-disposal ponds. The Siskiyou County Flood Control and Water Conservation District, under order from the California Regional Water Quality Control Board is required to stop discharging effluent from the ponds to the Sacramento River during the recreation season. Sewage discharge at the input to the disposal ponds is about three times the quantity that should be expected from a city the size of Mount Shasta. The input to the ponds probably includes a large quantity of groundwater leaking into the sewage system. The area where the ponds are located is underlain by glacial material containing several thin intercalated layers of nearly impermeable tuff. The layers of tuff, found from the surface downward, are barriers to vertical movement of water and prevent the disposal ponds from operating at the design level of efficiency. Infiltration rates, calculated and measured, at the existing ponds are about one-third the design capacity of the ponds. The first layer of tuff was found at depths ranging from 1.5 to 8 feet below land sur-

face and apparently is contiguous throughout the glacial material. (Woodward-USGS)
W75-08906

CONTENT OF THE TRACE ELEMENTS COPPER AND MANGANESE IN STREAM WATER, SOIL, AND PLANTS IN SOUTHERN UKRAINE, (IN RUSSIAN),
Odesskii Meditinskii Institut (USSR).
V. G. Kolesnikova, L. A. Kasatkina, O. P. Malakhova, V. I. Muzychenko, and D. M. Babov.
Gig Sanit. 38(3): 110-111, 1973.

Descriptors: *Copper, *Manganese, *Trace elements, *Soil chemical properties, Running waters, Soil-water-plant relationships, Crops, *Irrigation effects, Apples, Carrots, Potatoes.
Identifiers: Beets, Cabbage, Corn(Field), Grapes, Plants, *USSR(Ukraine).

Cu and Mn concentrations were determined in soil and in Dnestr stream water, USSR, used for irrigation and in plants (potatoes, beets, cabbage, carrots, corn, grapes, apples) of irrigated and unirrigated fields. Soil and water samples were obtained in the summer, autumn and spring over a 4 yr period. A photocolorimetric method was used. Cu concentration in crops from unirrigated soil was 1-1/2-2 times higher than in irrigated crops. Similar results were obtained for Cu concentrations in soil. Mn concentration in crops from irrigated and unirrigated soil did not vary significantly.--Copyright 1975, Biological Abstracts, Inc.
W75-08907

STUDY OF THE EFFECTIVENESS OF WATER TREATMENT PLANTS IN REMOVING BENZO(A)PYRENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5D.
W75-08924

MERCURY IN WATER, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-08934

SALT WATER DETECTION IN THE CIMARRON TERRACE, OKLAHOMA.
Oklahoma Water Resources Board, Oklahoma City.
For primary bibliographic entry see Field 5A.
W75-08936

RADIOECOLOGY OF BOMBAY HARBOR--A TIDAL ESTUARY,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
B. Patel, C. D. Mulay, and A. K. Ganguly.
Estuarine and Coastal Marine Science, Vol 3, No 1, p 13-42, January 1975. 10 fig, 13 tab, 61 ref.

Descriptors: *Radioecology, *Radioactive waste disposal, *Nuclear wastes, *Radioactivity, *Environmental effects, Waste disposal, Radioactive wastes, Chemical wastes, *Radioisotopes, Ecology, Biology, Estuaries, Fish, Estuarine environment, Plankton, Aquatic habitats, Water pollution effects, Aquatic environment, Sediments, Biota, *Path of pollutants.
Identifiers: *Bombay Harbor(India).

Low level liquid radioactive waste from nuclear facilities at Bhabha Atomic Research Centre, Bombay, are released into Bombay harbor after monitoring and dilution. The interactions of gamma-emitting fission product nuclides, especially cesium-137, with sedimentary particles and biota were studied during 1968-1971. Cesium-137 is first scavenged by the sedimentary particles, followed by cerium-144 and ruthenium-106. Zirconium/niobium-95, though present in the effluent, was not sorbed. Cesium-137 was distributed throughout the harbor, whereas cerium and ruthenium deposition were limited to a few stations off Trombay coast. Maximum deposition of activity was found in the upper 5-cm layer of the sediment column; decreasing thereafter either intermittently or exponentially with depth. The occurrence of artificial radioactivity in fish and shellfish of economic importance in 1965 before regular discharge began was below detection limit. Analysis since then showed accumulation of cesium-137 only. The absolute concentration as such, however, varied from species to species. The radiation dose through the contaminated environment to the benthic communities was far below the limits required to produce any detectable radiation damage. The radiation dose to fishermen, both internally through the consumption of contaminated marine products and externally through fishing over the contaminated bed, was also well below the permissible dose limit. (Henley-ISWS)
W75-08964

NITRIFICATION IN THE SCHELDT ESTUARY (BELGIUM AND THE NETHERLANDS),
Brussels Univ. (Belgium). Laboratorium voor Ekologie en Systematiek.
G. Billen.
Estuarine and Coastal Marine Science, Vol 3, No 1, p 79-89, January 1975. 6 fig, 28 ref.

Descriptors: *Nitrification, *Nitrogen cycle, *Bacteria, *Organic matter, *Nitrogen, Ammonium, Nitrates, Nitrites, Nitrogen compounds, Water quality, Fungi, Microorganisms, Sediments, Analytical techniques, Hydrogen ion concentration, Oxidation-reduction potential, Inorganic compounds, Estuaries.
Identifiers: *Scheldt Estuary(Belgium-The Netherlands), Redox potential.

Nitrification and repartition of nitrifying bacteria were investigated in the autoepuration zone of the Scheldt Estuary. Measurements of vertical profiles of nitrate and nitrite concentration in the interstitial water of sediments showed that nitrification in sediments is very low, implying that most of the nitrate and nitrite production occurs in the water of the river itself. Nitrifying bacteria, probably of terresterial origin, are present throughout the water along a longitudinal profile of the estuary, with a regular decrease in numbers downstream. However, nitrification occurs only in a zone of favorable oxidation-reduction conditions, which coincides with the thermodynamic stability fields of nitrate and nitrite with respect to ammonium. (Henley-ISWS)
W75-08966

OBSERVATIONS OF BOTTOM-WATER FLUSHING IN A FJORD-LIKE ESTUARY,
National Science Foundation, Washington, D.C. Oceanography Section.
For primary bibliographic entry see Field 2L.
W75-08967

AN EMPIRICAL METHOD OF ESTIMATING THE RETENTION OF PHOSPHORUS IN LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
W. B. Kirchner, and P. J. Dillon.
Water Resources Research, Vol 11, No 1, p 182-183, February 1975. 1 fig, 1 tab, 7 ref.

Descriptors: *Nutrients, *Phosphorus, *Model studies, *Lakes, Water balance, Surface waters, Hydrologic systems, *Canada, *Estimating.

The relationship between phosphorus retention and several other lake and watershed parameters was examined for 15 Canadian lakes. Multiple linear regressions were first attempted, but the model developed from the best correlation would have required extensive field measurements for accurate predictive use. Therefore, nonlinear relationships were investigated, resulting in a model relating the areal water load q sub s in meters per year of a lake to its phosphorus retention coefficient R sub p. R sub p = 0.426 exp (-0.271 q sub s) + 0.574 exp (-0.00949 q sub s). This model was found to be theoretically sound, and the predicted and measured values were in close agreement with a correlation coefficient of 0.94. The apparently closer relationship of the phosphorus retention coefficient to areal water load than to volumetric water load (or water renewal time) was not explainable. (Harmeson-ISWS)
W75-08970

GROSS PARAMETER SOLUTIONS OF JETS AND PLUMES,
Chalmers Univ. of Technology, Goteborg (Sweden).
For primary bibliographic entry see Field 8B.
W75-08980

A TEST OF A SIMPLE NUTRIENT BUDGET MODEL PREDICTING THE PHOSPHORUS CONCENTRATION IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-08986

WATER QUALITY FEATURES OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
T. A. Butts, R. L. Evans, and S. Lin.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 943, $4.25 in paper copy, $2.25 in microfiche. Report of Investigation 79, 1975. 60 p, 35 fig, 30 tab, 23 ref, 8 append.

Descriptors: *Water quality, *On-site investigations, *Data collections, *Illinois, *Rivers, Surveys, Algae, Bacteria, Coliforms, Nitrogen, Nitrates, Oxygen demand, Sediments, Ammonia, Nitrites, Benthos, Streams, Water pollution control, Water temperature, Biochemical oxygen demand, Evaluation, Measurement, Statistical methods, Analysis, Model studies.
Identifiers: *Upper Illinois Waterway, Benthic organisms, Carbonaceous demand, Nitrogenous demand.

Water quality data obtained from field surveys are summarized together with hydraulic and hydrologic data to determine wastewater treatment needs. The dissolved oxygen resources of the Upper Illinois Waterway are depressed because of a combination of oxygen demand sources including carbonaceous and nitrogenous BOD, benthic biological extraction, and sediments. Because of these demands, maintenance of 6.0 mg/l DO in the stream system is difficult, and achievement of a minimum DO requirement of 5.0 mg/l requires the nitrogenous and carbonaceous demand be substantially reduced. Collection of the waterway algal types reveals that diatoms are the dominant group comprising about 85% of the total densities. However, algal concentrations do not impair use of the waterway for recreation. Fecal coliform bacteria densities decrease with downstream movement at a rate of 0.77 per day in the upper pools and 0.42 per day in the lower pools. About 9% of the total coliform bacteria population are fecal coliforms. Only 3 of 19 stations sampled met the bacterial quality standards required by the Illinois Pollution Control Board. (Humphreys-ISWS)
W75-08991

PUBLICATIONS AND REPORTS RESULTING FROM RESEARCH GRANTS FUNDED THROUGH COASTAL POLLUTION BRANCH,

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY.
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-08994

THE OHIO RIVER-MCALPINE POOL REPORT: KENTUCKY-INDIANA,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W75-08997

SIMULATION OF URBAN RUNOFF, NUTRIENT LOADING, AND BIOTIC RESPONSE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5C.
W75-09022

APPENDIX - HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM QUARTERLY SUMMARY REPORT, MARCH 1, 1974 THROUGH JUNE 1, 1974.
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W75-09065

STRONTIUM-90 AND STRONTIUM-89 IN MONTHLY DEPOSITION AT WORLD LAND SITES.
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W75-09066

RADIONUCLIDES AND LEAD IN SURFACE AIR,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W75-09067

RADIOSTRONTIUM IN MILK AND TAP WATER.
Health and Safety Lab. (AEC), New York.
In: Report No HASL-284, Appendix, p C-1 - 7, July 1974. 2 fig, 3 tab.

Descriptors: *Monitoring, *Fallout, *Strontium, *Cesium, *Milk, *Potable water, Cities, Food chains, Data collections, Publications, Sampling, Analysis, New York.
Identifiers: *New York City(NY).

In 1954, the Health and Safety Laboratory began monitoring liquid whole milk in New York City for Strontium 90 in order to estimate the dietary contribution from the ingestion of this radionuclide from this source. During the same year, tap water sampling was begun on a routine basis at the laboratory which receives its supply from one of the main reservoirs servicing New York City. Although a more complete study of the Strontium 90 content of the diets in three major U. S. cities was started in March 1960, milk and tap water analyses in New York City have been continued in order to provide a detailed and continuous history of the contamination levels of these staples. The monthly Strontium-90 to calcium ratios for New York City since the inception of the milk sampling program are presented. Strontium-90 data obtained from the New York City tap water samples since the inception of the sampling program also are presented. Available Cesium-137 data for the tap water samples are given. (See also W75-09065) (Houser-ORNL)
W75-09068

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH, PART 3 ATMOSPHERIC SCIENCES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09069

CHARACTERIZATION OF SOURCES AND AMBIENT POLLUTANTS.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09070

TRANSPORT, DIFFUSION, AND TURBULENCE.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09071

ATMOSPHERIC TRANSFORMATION PROCESSES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09072

REMOVAL AND RESUSPENSION PROCESSES - DRY DEPOSITION OF PARTICLES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09074

REMOVAL AND RESUSPENSION PROCESSES - RESUSPENSION OF PARTICLES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09075

SPECIAL STUDIES - COOLING TOWER RESEARCH - BIOMETEOROLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09076

MODEL FOR ACCUMULATION OF METHYL MERCURY IN NORTHERN PIKE ESOX LUCIUS,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
T. Fagerstrom, B. Asell, and A. Jernelov.
Oikos, Vol 25, No 1, p 14-20, 1974. 1 fig, 35 ref.

Descriptors: *Mercury, *Mathematical Models, *Pikes, *Model studies, Bioassay, Heavy metals, Absorption, Metabolism, Statistical models, Size, Animal growth, Growth rate, Food chains, Path of pollutants, Water pollution effects.
Identifiers: *Methyl mercury, *Bioaccumulation, *Esox lucius, Tissue analysis, Body burden.

A compartmental model of mercury residue accumulation in individual fishes is presented. The model assumes a single residue pool that acquires methyl mercury from respired water and with the diet. Uptake and clearance of residue are treated as functions of metabolic rate, which is itself size-dependent. The parameters for the model are estimated from a release-recapture experiment and from Literature data, and the solutions produced by the model when using these estimates are compared with real-world data where the latter set of data is independent of the set that was used for parameter estimation. The correspondence between the calculated concentration of methyl mercury in lateral muscle tissue and empirically observed values is acceptable though the calculated values in the lower weight range are somewhat high. The possibility that the model may apply to other substances is discussed. (Katz)
W75-09145

EXPERIMENTAL STUDIES ON THE EFFECTS OF COPPER ON A MARINE FOOD CHAIN,
Marine Lab., Aberdeen (Scotland).
For primary bibliographic entry see Field 5C.
W75-09146

PRESENCE OF LIPID-SOLUBLE CHLORINATED HYDROCARBONS IN MARINE OILS,
Central Inst. for Industrial Research, Oslo (Norway).
For primary bibliographic entry see Field 5A.
W75-09147

THE USE OF ARTIFICIAL SUBSTRATES IN SAMPLING ESTUARINE BENTHOS,
York Univ., Downsview (Ontario). Dept. of Biology.
C. I. Goddard, M. H. Goodwin, and L. A. Greig.
21Transactions of the American Fisheries Society, Vol 104, No 1, p 50-52, 1975. 1 fig, 1 tab, 12 ref.

Descriptors: *Model studies, *Benthos, *Aquatic productivity, Aquatic animals, *Estuarine environment, *Biomass, Benthic fauna, Marine animals, Aquatic habitats, Aquatic environment, Estuaries, Scuba divers, Sediments, Detritus, Canada.
Identifiers: *St. Croix River(New Brunswick), *Artificial substrate, Species density, Placopeten magellanicus, Buccinum undatum, Strongylocentrotus droebachiensis, Cucumaria frondosa, Asterias vulgaris.

A comparison was made between density estimates of estuarine benthos based on artificial substrate sampling and direct observation by divers in St. Croix River estuary, New Brunswick. Of six species occurring in the sample area - giant scallop, waved whelk, sea urchin, sea cucumber, starfish and sea anemone, the latter four were collected on artificial substrates. Density of these four species was significantly higher on artificial substrates than on natural surfaces. Differences suggest that artificial substrates may preferentially sample certain portions of the fauna. (Katz)
W75-09149

SWEDISH PERSPECTIVES ON MERCURY POLLUTION,
Institute for Water and Air Pollution Research, Stockholm (Sweden). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-09157

STUDIES ON THE CYTOLYTIC EFFECTS OF SEASTAR (MARTHASTERIAS GLACIALIS) SAPONINS AND SYNTHETIC SURFACTANTS IN THE PLAICE PLEURONECTES PLATESSA,
Institute of Marine Biochemistry, Aberdeen (Scotland).
For primary bibliographic entry see Field 5C.
W75-09161

TISSUE HYDROCARBON BURDEN OF MUSSELS AS POTENTIAL MONITOR OF ENVIRONMENTAL HYDROCARBON INSULT,
Naval Biomedical Research Lab., Oakland, Calif.
L. H. DiSalvo, H. E. Guard, and L. Hunter.
Environmental Science and Technology, Vol 9, No 3, p 247-251, March 1975. 4 fig, 3 tab, 12 ref.

Descriptors: *Bioindicators, *Mussels, *Monitoring, Indicators, Water quality, Analytical

techniques, Organic compounds, Invertebrates, Estuaries, Path of pollutants, *Oil, Pollutants, *California, Water pollution effects.
Identifiers: Mytilus edulis, Mytilus californianus, *Tissue analysis, Hydrocarbon burden, Bioaccumulation, *San Francisco Bay(Calif).

A simplified method for the analysis of total tissue hydrocarbon burden was used to measure hydrocarbon concentrations in the mussels Mytilus edulis and M. californianus as an indicator of chronic hydrocarbon insult. Mussels transferred from cleanwater stations to polluted water stations took up hydrocarbons, and when they were replaced in clean waters, their hydrocarbon content approached cleanwater baseline values. Mussels transferred from polluted water to clean water lost a minor fraction of their hydrocarbon burden over a 10-week period. The mussels were useful as systems monitors of chronic hydrocarbon pollution, although initial results obtained with other San Francisco invertebrates suggest that certain of these may also be of value as hydrocarbon monitors. (Katz)
W75-09163

TWO-DIMENSIONAL EXCESS TEMPERATURE MODEL FOR A THERMALLY LOADED STREAM,
Geological Survey, Bay Saint Louis, Miss.
D. P. Bauer, and N. Yotsukura.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 126, $5.25 in printed copy, $2.25 in microfiche. Computer Contribution, November 1974. 91 p, 2 fig.

Descriptors: *Thermal pollution, *Mathematical models, *Water temperature, Streams, Hydroelectric plants, Forecasting, *Path of pollutants, Dispersion, Diffusion, Computer models, Analytical techniques.
Identifiers: Excess temperature, Convective diffusion.

A digital model which calculates distribution of excess temperature (temperature in excess of natural water temperature) or soluble contaminant concentration in a steady flow natural stream is described. The program is based on approximate solutions to a convective diffusion equation combined with an exponential decay equation. The program is useful for prediction purposes in a stream region where the waste is uniformly mixed with depth while still markedly nonuniform in the transverse and longitudinal directions. (Woodard-USGS)
W75-09174

SALT-BALANCE STUDY OF PAUBA VALLEY, UPPER SANTA MARGARITA RIVER AREA, RIVERSIDE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. W. Warner.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 252, $3.75 in printed copy, $2.25 in microfiche. Water-Resources Investigations 43-74, February 1975. 44 p, 3 fig, 14 tab, 26 ref, 4 append.

Descriptors: *Salt balance, *Irrigation, *Waste water disposal, *Water pollution, Water quality, Saline water, Salinity, Groundwater, Hydrogeology, Groundwater movement, *California, Sewage disposal.
Identifiers: *Pauba Valley(Calif).

The salt balance was calculated in the groundwater in the shallow aquifer in Pauba Valley, Calif., in two steps: (1) solution of the hydrologic-balance equation; and (2) solution of the salt-balance equation. Solution of these equations yielded a negative salt balance of about 500 tons of salt per year. Local areas within the valley may be accumulating salt in the groundwater. The salt balance was calculated for the 23-year time period from 1950 through 1972. Proposed sewage-disposal ponds in Pauba Valley should not cause any major effects on the salt balance of the shallow aquifer. Disposal of the sewage effluent either by irrigation or by direct recharge to the groundwater should be feasible. If the sewage effluent is used to irrigate crops, more salt will be retained within the system than would be retained by disposal of the effluent by direct recharge. The salt load on the hydrologic system from disposal of sewage effluent will be partly reduced by the increase in discharge out of the groundwater system and the salt associated with it. (Knapp-USGS)
W75-09177

UPWARD MIGRATION OF DEEP-WELL WASTE INJECTION FLUIDS IN FLORIDAN AQUIFER, SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
M. I. Kaufman, and D. J. McKenzie.
Available from Superintendant of Documents, US Government Printing Office, Washington, DC 20402, for $3.15 in paper copy, $2.25 in microfiche. Journal of Research of the US Geological Survey Vol 3, No 3, p 261-271, May-June 1975. 11 fig, 3 tab, 13 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Geochemistry, *Path of pollutants, *Florida, Water pollution sources, Groundwater movement, Aquifer characteristics, Industrial wastes, Hydrogeology, Water levels, Sampling, Chemical analysis, Hydrologic data, Chemical reactions, Chemical properties, Water quality.
Identifiers: *Lake Okeechobee area(Fla).

Geochemical data from an industrial deep-well waste injection system southeast of Lake Okeechobee, Fla., indicate a decrease in sulfate concentration concomitant with an increase in hydrogen sulfide concentration, a result of oxidation of injected organic waste by anaerobic bacteria. Subtle decreases in the sulfate-chloride ratio suggest that the waste migrated upward to a shallow monitor well about 27 months after waste injection began and again within 15 months of the resumption of waste injection after the injection well was deepened. The possibility of a hydraulic connection between the injection zone and overlying monitoring zone is implied. The decrease in the sulfate-chloride ratio appears to be a sensitive indicator of waste migration. Potential conflicts exist in the use of the Floridan aquifer for waste disposal and subsequent use as a natural resource. (Woodward-USGS)
W75-09190

PRELIMINARY FINDINGS OF A LEACHATE STUDY ON TWO LANDFILLS IN SUFFOLK COUNTY, NEW YORK,
Geological Survey, Mineola, N.Y.
G. E. Kimmel, and O. C. Braids.
Journal available from Sup Doc, U.S. Gov't. Print. Off. 20402 for $3.15. Journal of Research of the US Geological Survey, Vol 3, No 3, p 273-280, May-June 1975. 5 fig, 7 ref.

Descriptors: *Landfills, *Water quality, *Path of pollutants, *Groundwater movement, *Solid wastes, *New York, Water pollution sources, Geochemistry, Chemical reactions, Soil properties, Leachate, Infiltration, Soil chemistry, Sampling, Hydrologic data, Chemical analysis.
Identifiers: Babylon(NY), Islip(NY).

Plumes of leachate-enriched groundwater extend 10,600 and 5,000 ft downgradient from landfills in the towns of Babylon and Islip, N.Y., respectively, and extend vertically beneath the landfills to the base of the upper glacial aquifer, whose thickness ranges from 71 to 77 ft at the Babylon site and is 170 ft at the Islip site. The Babylon and Islip landfills were started in 1947 and 1933, respectively. The quantities of groundwater in the plumes are 2 billion gal at Babylon and 1 billion gal at Islip. Differences in quantity of water in the plumes and length of the plumes may result partly from a slower rate of refuse accumulation at Islip than at Babylon. Specific conductance and concentrations of HCO3, Cl, and SO4 are the best indicators of the plume. Their concentrations are significantly greater in plume water than in ambient water, and they may be several hundred times greater. Except for Fe, Mn, and Zn, which are ubiquitous in refuse, soil, and aquifer sediments, there are no noteworthy concentrations of heavy metals in leachate-enriched groundwater. Fe and Mn are especially enriched in the concentrated zones of the plumes--as much as 400,000 micrograms per litre. (Woodard-USGS)
W75-09191

CHEMICAL MODELS FOR SULFATE REDUCTION IN CLOSED ANAEROBIC MARINE ENVIRONMENTS,
South Carolina Univ., Columbia. Dept. of Geology.
L. R. Gardner.
Geochimica et Cosmochimica Acta, Vol 37, p 53-68, 1973. 8 fig, 2 tab, 21 ref. OWRR B-055-SC(1).

Descriptors: Chemical properties, *Sulfates, *Anaerobic conditions, *Marine Geology, *Model studies, Mass transfer, *Carbonates, Chemical reactions, *Iron oxides, Sulfides, Sediments, Hydrogen ion concentration.
Identifiers: Sulfate reduction, Marine environment, *Chemical reaction models.

Reactions models, based on mass transfer calculations, have been computed for sulfate reduction in closed, anaerobic, marine systems containing (1) inert sediment, (2) CaCO3, (3) Fe2O3, and (4) Fe2O3 + CaCO3. The diagrams resulting from the computations show variations in the concentrations of aqueous species as a function of grams of organic matter oxidized. The calculations show that the buffering capacity increases from system (1) to system (4). The computations also reveal that the asymptotic limit of pH reduction in systems (1) and (2) is 6.60 whereas in systems (3) and (4) it is pH 6.92. The models predict that in system (2) CaCO3 should dissolve as a result of sulfate reduction whereas in systems (3) and (4) CaCO3 should precipitate along with iron sulfide. Three natural occurrences of sulfate reduced marine water are used to show applications based the models. The models are useful in that they illustrate the major factors that control the pH of anoxic waters.
W75-09229

OPTIMAL OPERATION OF SURFACE AND GROUNDWATERS FOR POLLUTION DILUTION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux.
Paper for presentation at XVI International Association for Hydraulic Research Congress. Sao Paulo, Brazil, July 27 - August 1, 1975. 7 p, 1 fig, 2 tab, 2 ref. OWRR B-109-COLO(4), 14-31-0001-4067.

Descriptors: Groundwater, Surface-groundwater relationships, Regulation, Water Quality, *Optimization, Risks, Water law, Conjunctive use, Model studies, Waste dilution, Decision making.
Identifiers: Groundwater management, Conjunctive operation.

The applicability of a new approach to hydrologic modeling is demonstrated on a highly simplified case, for the purpose of illustration. In this illustration the environmental quality regulatory agency is faced with the decision of imposing a weekly quota on volume of water withdrawn from a well serving a new subdivision, in order to preserve both the downstream water quality standards and the senior water rights of a farmer. Decisions are made at the beginning of the irrigation season and

then updated every week. The minimum needed storage capacity to supply the subdivision while satisfying the downstream legal and quality constraints is calculated each week. From the distribution of these various minimum capacities a design capacity is then selected.
W75-09230

NITROGEN CONTENT OF SHALLOW GROUND WATER IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
J. W. Gilliam, R. B. Daniels, and J. F. Lutz.
Journal of Environmental Quality, Vol 3, No 2, p 147-151, April-June 1974, 2 fig, 2 tab, 7 ref. OWRR B-063-NC(1).

Descriptors: *Fertilizers, *Leaching, *Nitrogen, Nitrates, Ammonia, Water quality, Sediments, *North Carolina, *Coastal plains, *Path of pollutants, *Groundwater.
Identifiers: *Nitrate-nitrogen, Ammonia-nitrogen.

The nitrate-nitrogen and ammonia-nitrogen concentrations in shallow (< 3 m) ground water under a range of soil types, drainage conditions, and type of crop grown were monitored. The nitrate-nitrogen levels were always low (1 ppm or less) in ground water under wooded areas, but were somewhat higher under cultivated fields, usually 1 to 5 ppm although several values of 10 to 20 ppm were recorded. Concentrations in all wells were always higher during winter months with no relationship between cultivated crop and nitrate-nitrogen in the ground water. The nitrate-nitrogen concentration was almost always higher in the middle of the field than on the edge even though direction of water flow was toward the edge. Denitrification may be responsible. There was little difference in ammonia-nitrogen concentration in water under cultivated fields and under unfertilized woods or pasture, with concentrations normally in the range of 0.1 to 1 ppm with the higher levels being found under poorly-drained soils. Based upon the characteristics of the surface sediments, it is concluded that very little of the nitrate-nitrogen present in the shallow ground water moves into deep aquifers in any area of the North Carolina Coastal Plain. However, the amount of nitrate-nitrogen that moves through the surficial sediments to the streams probably varies with location and characteristics of the confining beds. (McJunkin-North Carolina State)
W75-09232

TRANSIENT ANALYSIS OF WATER QUALITY IN THE DELAWARE ESTUARY SYSTEM VIA ONE-DIMENSIONAL INTRA-TIDAL TIME VARYING MODELS WITH APPLICATION TO THE IDENTIFICATION OF THE TIDAL DISPERSION COEFFICIENT USING DISCRETE SPACE CONTINUOUS TIME OCEAN SALINITY DATA,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering.
B. Davidson, Y. S. Shieh, and S. M. Yih.
In: Proceedings of the Modeling and Simulation of Water Resources Systems Conference, Univ. of Ghent, Ghent, Belgium, Aug 1974, North-Holland Publishing Co, p 399-415, 1975. 9 fig, 5 ref. OWRT B-045-NJ(3), B-049-NJ(3), A-036-NJ(1), A-045-NJ(1).

Descriptors: *Approximation method, Computers, *Model studies, Numerical analysis, Systems analysis, *Water quality, *Delaware River, Estuaries, Salinity, *Path of pollutants, Dispersion, *New Jersey.
Identifiers: *Partial differential equations, Tidal dispersion coefficient.

Water quality in the Upper Delaware River Estuary System was analyzed using an intra-tidal, time-varying, one-dimensional, non-isothermal, computer simulation model. Shock-loading effects and stationary-state quality profile under a wide variation of conditions were investigated. Results made it possible to estimate the effective longitudinal dispersion coefficient using time-varying salinity data at several gaging stations in the Upper Delaware Estuary System. The methodology was put into the form of a distributed parameter identification scheme.
W75-09233

STUDIES OF THE BEHAVIOR OF HEAVY PARTICLES IN A TURBULENT FLUID FLOW,
Illinois Univ., Urbana. Nuclear Engineering Lab.
For primary bibliographic entry see Field 8B.
W75-09237

LINEARIZED NON-STOKESIAN DRAG IN TURBULENT FLOW,
Illinois Univ., Urbana. Nuclear Engineering Lab.
For primary bibliographic entry see Field 8B.
W75-09238

ENVIRONMENTAL STUDY OF THE MARINE ENVIRONMENT NEAR NOME, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W75-09275

ASSESSMENT OF OFFSHORE DUMPING; TECHNICAL BACKGROUND: PHYSICAL OCEANOGRAPHY, GEOLOGICAL OCEANOGRAPHY, CHEMICAL OCEANOGRAPHY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA Technical Memorandum ERL MESA-1, April 1975. 83 p, 15 ref. Robert L. Charnell (Ed).

Descriptors: *Waste disposal, *Oceanography, *Ocean currents, Ocean circulation, Marine geology, Chemistry, Sludge disposal, Sedimentation, Sewage sludge, Sampling, New York.
Identifiers: *New York Bight, Water columns, ERTS data.

Physical, geographical, and chemical oceanographic features of the New York Bight and their relationship to waste and sewage disposal in the area are examined. The investigation includes studies of ocean currents, sea floor topography, sedimentation, methods of sewage disposal, and the chemical composition of sewage. Data from sampling in the area are presented. (NOAA)
W75-09278

DISPERSION OF GRANULAR MATERIAL DUMPED IN DEEP WATER,
Canada Centre for Inland Waters, Burlington (Ontario).
B. G. Krishnappan.
Scientific Series No 55, 114 p, 1975, 9 fig, 1 tab, 1 append.

Descriptors: *Dispersion, *Dredging, *Entrainment, Waste dumps, Sludge, Settling velocity, Deep water, Physical properties, Particle size, Spoil banks.
Identifiers: *Granular material, Lake dumping, Ocean dumping.

The motion of dredged material when dumped near the surface of deep water is formulated using the principle of superposition. The dredged material is considered to consist of various fractions of uniform-size particles and each fraction exerts an influence on the total behaviour of the dredged material in the same proportion as its negative buoyancy. The behaviour of uniform-size particles has been formulated using the theory of dimensions and laboratory experiments. The results show that the motion of the particles can be treated in two distinct phases, namely, the initial 'entrainment' phase and the final 'settling' phase. During the entrainment phase, the size of the 'cloud' grows owing to the incorporation of external fluid, while the vertical downward velocity diminishes. During the settling phase, when the vertical downward velocity is the same as the fall velocity of the individual solid particles constituting the cloud, the increase in the cloud size is due solely to ambient turbulence. The method developed permits the evaluation of vertical height and horizontal size of the 'mound' formed by the deposition of the dredged material at the bottom of deep water. It also indicates how the above characteristics of the mound depend on the volume of the dump, the size distribution of the dredged material and height of the deep water, therby providing guidance for the selection of optimum dump size and the location for dispoal of the dredged material. (Envir-Canada)
W75-09290

AN ANALYSIS OF THE DYNAMICS OF DDT IN MARINE SEDIMENTS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
J. H. Phillips, E. E. Haderlie, and W. L. Lee.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 511, $5.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-660/3-75-013, May 1975. 98 p, 8 fig, 24 tab, 11 ref.

Descriptors: Degradation, *DDT, DDD, DDE, Coasts, Assay, Pollution, Bays, *California, Nitrates, *Sediments, *Analytical techniques, *Microbial degradation, *Chemical degradation, Pesticide residues, Chlorinated hydrocarbon pesticides, Organic pesticides, Aerobic conditions.
Identifiers: Rates of change, *Monterey Bay(Calif).

The concentrations of DDT, DDD and DDE were measured in sediments at 57 stations in Monterey Bay on the Central California coast during 1970-1971. Mean concentrations in parts per billion were DDT 3.1, DDD 2.3, and DDE 5.4. During 1973 nineteen of the original stations were sampled. Mean concentrations were DDT 15.5, DDD 2.3, and DDE 5.4 ppb. Two approaches to the estimation of annual system rates for input, I, output, 0, decay, D, and internal translocation, T sub I and T sub 0 expressed as decimal fractions of existing concentrations were developed, and fraction programs that permit rapid estimations were written. The mean annual rates in South Monterey Bay obtained were for DDT, I + 1.30, O 0.59, 0 -0.036 T sub I and T sub 0 plus or minus 0.80 with a residence time of 11 years and life time of 29 years. An I of 1.30 means the amount of input is 130% of the existing concentration per year. Rates for DDD were, I +0.25, 0 -0.11, D -0.025, T sub I and T sub 0 plus or minus 0.20 with residence time of 7 years and life time of 44 years. Rates for DDE were I +0.28, O 0.10, D -0.027, T sub 0 and T sub I plus or minus 0.22 with residence time of 8 years and life time of 39 years. Laboratory assays were developed to determine the relative rate of decomposition in sediment under conditions selective for various physiologically different kinds of microorganisms. Decay under aerobic conditions was greater than under anaerobic conditios. Nitrate increased the rate of decomposition under anaerobic conditions. The Q10 for decay was 2.5 (EPA)
W75-09300

ASBESTOS IN POTABLE WATER SUPPLIES,
Johns-Manville Sales Corp., Denver, Colo. Public Water Pipe Div.
For primary bibliographic entry see Field 5A.
W75-09302

THE STUDY ON THE AQUATIC INSECT FAUNA OF THE MATSUKAWA AND YONAKO RIVERS (MINERAL ACID POLLUTED RIVER), (IN JAPANESE),
Rissho Women's Coll., Koshigaya (Japan).
Y. Ide.

Bull Inst Nat Educ Shiga Heights, 10 p, 11-24, 1971. Illus.

Descriptors: Asia, *Rivers, *Insects, Water quality, *Acidic water, *Aquatic insects, Aquatic populations, Water pollution sources.
Identifiers: Ephemeroptera, *Japan, Matsukawa River, Protonemoura, Trichoptera, Yonako River.

Relations between the water quality and the aquatic insects fauna were investigated at 24 places: 15 strongly acidic places along the Matsukawa and Yonago Rivers (Japan) and 9 neutral areas along their tributaries. Only 8 spp. were found at the 15 acidic sites while 40 were found at the 9 neutral sites. Water of the acidic places contained significant amounts of Fe++, Fe+++ and SO4--; especially the concentration of SO4-- being from 49 ppm (lowest)-87 ppm (highest). At the acidic sites the dominant species of aquatic insects was Protonemoura spp. Ephemeroptera spp. were rare at the acidic places. At the neutral places most of the dominant species were those of Trichoptera or Ephemeroptera. When the percentages of appearance at the 90% confidence level of the main aquatic insects were put in order of dominancy in a table or a graph, if a smooth gradually decreasing curve was obtained, the river would be normal and clean. If the curve was of the type decreasing sharply between the 1st and 2nd dominant species, the river would be somewhat abnormal. The all acidic sites of the rivers investigated belonged to this type. When the aquatic insects were classified by order to obtain a species distribution table, if Trichoptera or Ephemeroptera were most numerous, the area of river would be normal and clean. The 9 neutral sites of the rivers investigated belonged to this type.--Copyright 1973, Biological Abstracts, Inc.
W75-09316

PLANKTON, CHEMISTRY, AND PHYSICS OF LAKES IN THE CHURCHILL FALLS REGION OF LABRADOR,
Waterloo Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 2H.
W75-09317

MIXING ZONE STUDIES OF THE WASTE WATER DISCHARGE FROM THE CONSOLIDATED PAPER COMPANY INTO THE WISCONSIN RIVER AT WISCONSIN RAPIDS, WISCONSIN,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
J. A. Hoopes, D.-S. Wu, and R. Ganatra.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-26871, $4.25 in paper copy, $2.25 in microfiche. Report of 1969 Summer Field Surveys to Wisconsin, Dept. of Natural Resources and National Aeronautics and Space Administration, DNR, March 1973. 24 fig, 2 tab, 14 ref.

Descriptors: *Pulp wastes, *Mixing, *Waste dilution, Rivers, *Industrial wastes, Wastes, Water pollution sources, Wisconsin, On-site investigations, Effluents, Dispersion, Water pollution, Temperature, Velocity, River flow, Laboratory tests, Mathematical models, Outlets, Buoyancy, *Path of pollutants.
Identifiers: *Wisconsin River(Wis).

Consolidated Paper Company discharges effluent from its Wisconsin Rapids kraft pulp mill into the Wisconsin River. A field survey was conducted on September 12, 1969, of the effluent concentration distributions in the river. Effluent concentrations were determined from measurements of the temperature distribution; measurements of the velocity distribution in the vicinity of the outfall were also made. Horizontal and vertical concentration patterns of the waste discharge, developed from the data, are analyzed and compared with the results of laboratory experiments and of several mathematical models to determine the macroscopic characteristics and relations governing the effluent spreading and dilution for the effluent discharge, river and weather conditions during the survey. These characteristics include the centerline concentration variation, the centerline trajectory, and the lateral and vertical spreads of the effluent discharge. Due to limitations in the extent of the field observations, the analysis and comparison of the measurements is limited to the region within about 300 ft from the outfall. The effects of outfall submergence, of buoyance and momentum of the effluent, and of the pattern and magnitude of river currents on these characteristics are discussed. Finally, using the field observations, with results from the laboratory experiments and mathematical models, the extent and shape of the mixing zone is estimated for the effluent and river conditions on September 12, 1969. (Witt-IPC)
W75-09338

THE BOD AND TOXICITY OF EFFLUENTS FROM SULFITE PULPING FOR NEWSPRINT,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
G. J. Kubes, and A. Wong.
Preprint Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1975, p A149-153. 7 fig, 5 ref, 9 tab.

Descriptors: *Pulp wastes, *Sulfite liquors, *Toxicity, *Biochemical oxygen demand, Industrial wastes, Water pollution sources, Foreign research, Foreign countries, Canada, Legislation, Laboratory tests, Effluents, Organic loading.
Identifiers: Pulp yield, Sulfite mills, High-yield pulps, Newsprint mills.

High-yield bisulfite pulp mills, which are integrated with many eastern Canadian newsprint operations, produce acutely toxic effluents with extremely high organic loadings. The results of an experimental program, sponsored by Environment Canada and done at the Pulp and Paper Research Institute of Canada, to measure the toxicity and 5-day BOD of laboratory-produced sodium-base bisulfite pulps in the yield range of 60 to 80% are reported. Significant reductions in toxicity and 5-day BOD loadings were achieved by increasing pulp yield, but it was not possible to comply with Environment Canada's regulation for a 5-day BOD of 37.5 kg/air-dry ton solely by increasing yield. The properties of pulps prepared during this investigation seem to indicate that 75% is the maximum yield at which pulps can be obtained that are compatible with the needs of newsprint production. Ultrahigh-yield bisulfite pulps (80% plus) with adequate strength properties may be obtained by refining at high consistency. (Witt-IPC)
W75-09348

5C. Effects Of Pollution

SOME FACTORS AFFECTING THE SURVIVAL OF COLIFORM BACTERIA IN SEAWATER (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science Technology.
K. Ogawa.
J Oceanogr Soc Jpn. 30(2): 54-60, Illus, 1974, English summary.

Descriptors: *Estuaries, Shores, Analysis, *Coliforms, Microorganisms, *Bacteria, *Sea water, Saline water, Nutrients, *E. coli, Seashores.

Experiments were carried out to explain why the number of coliform organisms decreased rapidly from estuaries to offshore, and also in deeper layers, and why the appearance of the coliform types varied. In natural seawater, results did not show that Escherichia coli was eliminated by the self-purification or anti-biosis action of seawater. This organism decreased mainly because of starvation. Although the decreasing rate of bacterial density was delayed to enriched seawater, addition of nutrients even at the time of bacterial extinction promoted the appearance of a variant form of this bacteria with floc formation. Flocculation of bacterial cells was influenced by quality and quantity of added nutrients. Temperature affected floc formation, but the appearance of a variant form in flocculated cells of E. coli was not affected by temperature. Flocculated particles of coliform bacteria were absorbed on suspended particles in seawater and precipitated rapidly. This phenomenon seems to be a cause of the rapid disappearance of coliform bacteria in coastal waters. In bottom deposits the coliform bacteria probably survive longer in physiologically variant forms when suitable nutrients were supplied.--Copyright 1975, Biological Abstracts, Inc.
W75-08884

CONTRIBUTION TO ECOLOGY OF INDIAN AQUATICS: V. SEASONAL CHANGES IN BIOMASS AND RATE OF PRODUCTION OF 2 PERENNIAL SUBMERGED MACROPHYTES (HYDRILLA VERTICILLATA ROYLE AND NAIAS GRAMINEA DEL) OF RAMGARH LAKE OF GORAKHPUR (INDIA),
Saint Andrew's Coll., Gorakhpur (India). Dept. of Botany.
A. B. Sinha, and R. Sahai.
Trop Ecol, Vol 14, No 1, p 19-28, 1973. Illus.

Descriptors: *Seasonal, Ecology, Lakes, *Biomass, *Production, Aquatic plants.
Identifiers: Gorakhpur, Hydrilla-verticillata, *India(Ramgarh Lake), *Macrophytes, Najas-graminea, Perennials, Photosynthesis, Rain.

The maximum above ground, photosynthetic biomass of H. verticillata and N. graminea was found during Aug. (4.52 plus or minus 0.34 and 4.60 plus or minus 0.22 mt(metric tons) dry matter/ha respectively). The maximum underground biomass of these plants was 0.81 plus or minus 0.12 and 0.95 plus or minus 0.12 mt dry matter/ha respectively. The percentage of ash in dry matter of their biomass was only 18.0 to 22.0%. Highest production rate was 39.6 dry matter/m2 day (H. verticillata) and 52.6 g dry matter/m2/day (Naias graminea) during July-Aug., just after a few heavy showers of rain. The net dry and organic matter production during 1 yr growth was found as 3.64 mt/ha and 3.28 mt/ha respectively in H. verticillata and 3.24 mt/ha and 3.00 mt/ha respectively in N. graminea (values are exclusive of losses suffered by these plants during their respiration, physical damage and decay of their older parts).--Copyright 1974, Biological Abstracts, Inc.
W75-08932

MERCURY IN WATER, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 940, $9.25 in paper copy, $2.25 in microfiche. Water Resources Scientific Information Center, Report OWRT/WRSIC 75-203, May 1975, 308 p.

Descriptors: *Mercury, *Bibliographies, *Path of pollutants, Analytical techniques, Bioassay, Chemical analysis, Environmental effects, *Heavy metals, *Industrial wastes, *Pollutant identification, Toxicity, Trace elements, Water pollution effects.
Identifiers: Atomic absorption spectroscopy, Detection limits, *Mercury compounds.

This report, containing over 900 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). Volume 1 (see W72-04440) covered material announced in SWRA from 1968 through 1971. At the time of

search for this bibliography, the data base had 81,588 abstracts covering SWRA from 1972 through February 15, 1975 (Volume 8, Number 4). Author and subject indexes are included.
W75-08934

PHARMACOKINETICS OF TOXIC ELEMENTS IN RAINBOW TROUT, I. UPTAKE, DISTRIBUTION AND CONCENTRATION OF METHYLMERCURY BY RAINBOW TROUT (SALMO GAIRDNERI) TISSUES, II. THE MECHANISM OF METHYLMERCURY TRANSPORT AND TRANSFER TO THE TISSUES OF THE RAINBOW TROUT (SALMO GAIRDNERI),
State Univ. of New York, Buffalo.
E. J. Massaro.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 124, $3.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-660/3-74-027, December 1974. 30 p, 10 fig, 33 ref. 1BA022, 800989.

Descriptors: *Toxicity, Water pollution effects, *Rainbow trout, *Mercury, Trace elements, *Pollutant identification, Volumetric analysis, Lethal limit, Sulfur compounds.
Identifiers: *Pharmacokinetics, *Methylmercury.

203 Hg-methylmercury (MeHg) was administered intragastrically in a single dose (0.5 mg Hg/kg=3.3micro-Ci/kg) to trout (av. wt. 250g). The fish were sacrificed from 1.0 hr. to 290 days postadministration. Twenty tissues were analyzed for MeHg content by gamma scintillation spectrometry. The label was taken up rapidly by blood, gills, spleen, liver and kidney and more slowly by muscle, brain and lens. After 290 days: (a)blood, spleen, kidney, liver and lens had concentration factors (C.F.=tissue Hg conc./Hg dose x final tissue wt./initial tissue wt.)=1.0; (b)in general, C.F.s had dropped by at least 2/.3 from their maxima except for muscle, brain and lens in which the C.F.s remained=their maxima; (c)approximately 64% of the dose still remained in the fish and skeletal muscle (comprising approximately 55% of body weight) contained >40% of the residue. Assuming MeHg excretion to be a first order process, there are at least two rates of excretion--a rapid initial rate resulting in a biological half-retention time (HRT) of approximately 200 days and a slower, subsequent rate yielding an HRT of > 1000 days which, apparently, is governed by the rate of release of MeHg from the skeletal muscle. Hemoglobin (Hb) is the main methylmercury transport protein in trout blood. In vitro, MeHg is taken up rapidly in 3 minutes by red blood cells. MeHg binding in the RBC is reversible in vitro as demonstrated by the efflux of Hg from red blood cells (RBC) suspended in protein solutions. MeHg binding in the RBC also is reversible in vivo as gel filtration chromatography of liver soluble porteins yielded identical elution profiles for MeHg administered as the free salt or bound in RBCs. The number of reactive sulfhydryl (-SH) groups per molecule of Hb was found to be 4 by amperometric titration with MeHCl. The reactive -SH concentration in the RBC was calculated to be at least 20mM. A mechanism for the efflux of MeHg from the RBC is proposed involving the dissociation of MeHg from Hb initiated by -SH groups outside the RBC and migration of MeHg across the membrane as MeHgCl. (EPA)
W75-08938

EFFECTS OF EXHAUST FROM TWO-CYCLE OUTBOARD ENGINES,
Rensselaer Polytechnic Inst., Troy, N.Y. Bio-Environmental Engineering Div.
W. W. Shuster, L. Clesceri, S. Kobayashi, and W. Perrotte.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 567, $9.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio Report EPA-670/2-74-063, July 1974. 304 p,96 fig, 70 tab, 95 ref.

Descriptors: *Toxicity, *Water pollution sources, *Lakes, *Recreation wastes, Boating, *Oil wastes, Water pollution effects, Environmental effects, Adsorption, Evaporation, Sediments, Microbial degradation, Populations, Benthos, Chemical analysis, Bioassay, Organic compounds, Bibliographies.
Identifiers: *Exhaust emissions, Outboard engines, Lake George(NY).

A combined laboratory and field study has been made to determine the extent of pollution arising from the operating of two-cycle outboard engines in an oligotrophic/mesotrophic lake. The fate of the exhaust products discharged to a lake environment has been studied. Three bays having different boat usage were compared. Attempts have been made to examine the quantities of exhaust products found in the water column, the water surface, and in the bottom sediments. The role of such mechanisms as microbial decomposition, evaporation and adsorption has been studied. Results of these studies have shown very low levels of hydrocarbons, other than from natural sources, in sediments and the water column. Somewhat greater quantities were found in surface films. The microbiological studies and evaporative studies indicate that these mechanisms play a significant role in the dispersion of engine exhaust products. The relatively low levels of exhaust products found appear to be related to both purification mechanisms and to low levels of boating stress. Such indicators as surface film concentrations and threshold odor numbers follow boating usage patterns rather closely in the bays studied. (Katz)
W75-08950

MECHANISMS FOR DEEP WATER RENEWAL IN LAKE NITINAT, A PERMANENTLY ANOXIC FJORD,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W75-08969

A TEST OF A SIMPLE NUTRIENT BUDGET MODEL PREDICTING THE PHOSPHORUS CONCENTRATION IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
P. J. Dillon, and F. H. Rigler.
Journal of the Fisheries Research Board of Canada, Vol 31, No 11, p 1771-1778, November 1974. 1 fig, 4 tab, 10 ref.

Descriptors: *Budgeting, *Nutrients, *Phosphorus, *Lakes, Eutrophication, Epilimnion, Hypolimnion, Chlorophyll, Lake morphometry, Mixing, Oligotrophy, Mesotrophy, Sedimentation rates, Stratification, Trophic level, Model studies, Retention, Water balance, Surface waters, *Canada.
Identifiers: *Haliburton-Kawartha region(Ontario).

The total phosphorus budgets for a number of lakes in the Haliburton-Kawartha region of southern Ontario were measured over a 20-month period. Phosphorus loadings, phosphorus retention coefficients, mean depths, and water replenishment coefficients were used to test a simple nutrient budget model similar to that proposed by Vollenweider (1969) to predict the total phosphorus concentration in lakes. Mean lake depths ranged from 0.73 to 27.2 meters and, except in the case of two very shallow lakes whose mean depths were less than 1 meter, the concentrations predicted by the model were very close to those measured at spring overturn. Additional data from the literature supported the belief that this model could be used effectively for oligotrophic and mesotrophic lakes. The model's value lies in the fact that quantitative changes in phosphorus loadings can be interpreted in terms of changes in phosphorus concentration, which in turn can be related to changes in parameters that reflect a lake's trophic state, such as summer concentration of chlorophyll alpha. (Harmeson-ISWS)
W75-08986

WATER QUALITY FEATURES OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-08991

SHORT-TERM VARIATIONS IN ESTIMATES OF CHLOROPHYLL ABUNDANCE,
National Marine Fisheries Service, Woods Hole, Mass. Northeast Fisheries Center.
For primary bibliographic entry see Field 2K.
W75-08992

ACTINOMYCETALES ISOLATED FROM SAINT LOUIS BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
D. H. Roush.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10042, $3.75 in paper copy, $2.25 in microfiche. Sea Grant Publication No MSGP-72-014, December 1972. 32 p, 1 fig, 7 tab, 24 ref.

Descriptors: *Bays, *Actinomycetes, *Soil bacteria, *Mississippi, Water pollution, Mycobacterium, Tributaries, Sediments, Surface waters, Gulf of Mexico, Laboratory tests, Salinity.
Identifiers: *Saint Louis Bay(Miss), Streptomyces, Micronomospora, Nocardia.

Samples taken from Saint Louis Bay were examined for the presence of actinomycetes immediately after collection and in the laboratory. The majority of organisms isolated were found in surface water, bottom water, and sediment or core samples. All actinomycetes isolated were of the genus Streptomyces. Eight different types were isolated on the original plates and four on secondary plates. Salinity and position of the collecting stations were the most influential factors affecting isolation. The higher the salinity, the lower the number of actinomycetes and the fewer types isolated. Only one isolate grew well in salt water media. There was a slight increase in the number of different types of actinomycetes from secondary samples in months with the lowest salinity. Micromonospora and Nocardia were not isolated. The distribution of actinomycetes indicated soil pollution from incoming freshwater sources. Water temperature had only a minor influence. A study should be made to determine whether the Streptomyces isolated were of soil or marine origin and what ecological role they play in the Saint Louis Bay environment. (Buchanan-Davidson--Wisconsin)
W75-08993

PUBLICATIONS AND REPORTS RESULTING FROM RESEARCH GRANTS FUNDED THROUGH COASTAL POLLUTION BRANCH, PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY.
National Environmental Research Center, Corvallis, Oreg.
1974. 15 p, 156 ref.

Descriptors: *Publications, *Bibliographies, *Coasts, *Water pollution, Continental margin, Aerial photography, Photogrammetry, Algae, Dispersion, Estuaries, Heavy metals, Water pollution sources, Hydrodynamics, Marine bacteria, Marine fish, Oxygen demand, Phytoplankton, Inhibitors, Pollutants, Outlets, Turbulence, Diffusion, Waste disposal, Sediments, Tidal marshes, Dredging, Pesticide residues, Bacteria, Thermal pollution, Reservoirs, Outfall sewers, Baseline studies, Model studies, Fish diseases, Biocontrol, Benthos, Sulfides, Saline water intrusion.

A list of 156 extramural publications, indicating sources where they are available, relating to coastal pollution discuss various aspects of the subject. Among the areas discussed are aerial photography, algae, dispersion of pollutants, estuaries, floatables, heavy metals, hydrodynamics, marine bacteria, marine fish, mixing of stratified impoundments, oxygen consumption, phytoplankton growth inhibitors, various pollutants, including pesticide residues, submarine outfalls, turbulent diffusion of small particles, viruses, thermal pollution, saline water intrusion, waste disposal, and baseline studies. (Buchanan-Davidson--Wisconsin)
W75-08994

WATER QUALITY AND WASTE TREATMENT REQUIREMENTS ON THE UPPER HOLSTON RIVER, KINGSPORT, TENNESSEE, TO CHEROKEE RESERVOIR.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-227 573, $5.75 in paper copy, $2.25 in microfiche. Technical Study TS-03-71-208-97, July 1972. 143 p, 11 fig, 14 tab, 2 ref, 8 append.

Descriptors: *Water quality, *Waste treatment, *Pollution abatement, *Reservoirs, Rivers, *Tennessee, Biochemical oxygen demand, Dissolved oxygen, Nitrogen compounds, Aquatic weed control, Hydroelectric plants, Cooling water, Flow augmentation, Nutrient removal, Water pollution sources, Thermal pollution, Flow rates, Flow control, Reservoir releases, Tennessee Valley Authority.
Identifiers: *Holston River(Tenn), *Cherokee Reservoir(Tenn), Kingsport(Tenn).

Wastes with approximately 137,500 pounds/day of 5-day BOD were discharged into the Holston River near Kingsport, Tennessee. The ultimate oxygen demand from nitrification of total Kjeldahl nitrogen was 84,000 pounds. Sludge beds covered about 25% of the total bottom area between the confluence of the Holston River and the Cherokee Reservoir. Total benthic oxygen consumption for 22.8 miles of the River was over 31,200 pounds/day. An estimated 170 tons of attached aquatic weeds (primarily Potamogeton pectinates) covered the river bottom. The plants were beneficial to the dissolved oxygen of the system, but there was excessive variation in diurnal dissolved oxygen levels. Water temperature increased due to cooling water discharges. Water releases from the reservoir for a power plant affected river flow and dissolved oxygen levels. Pollution abatement schedules and limits should be implemented immediately. A minimum of 6.0 mg/l dissolved oxygen should be maintained in releases from the Fort Patrick Henry Dam. Total pollutional loads discharged should be limited to a maximum of 14,040 pounds/5-day BOD and 1940 pounds/day total Kjeldahl nitrogen. A minimum flow release of 750 cubic feet per second should be maintained. (Buchanan-Davidson--Wisconsin)
W75-08996

THE OHIO RIVER-MCALPINE POOL REPORT: KENTUCKY-INDIANA,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
D. W. Hill.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-227 061, $5.75 in paper copy, $2.25 in microfiche. Report June 1973. 137 p, 17 fig, 7 tab, 6 ref, 6 append.

Descriptors: *Water quality, *Dissolved oxygen, *Ohio River, *Kentucky, *Indiana, Ohio, Interstate rivers, Rivers, Thermal pollution, Standards, Sewage effluents, Sewage treatment, Industrial wastes, Municipal wastes, Water pollution, Water pollution control, Alkalinity, Analytical techniques, Water pollution sources, Water treatment, Enteric bacteria, Hydrogen ion concentration, Biochemical oxygen demand, Dissolved solids, Specific conductivity, Salmonella, River flow, Carbon, Ammonia, Nitrification, Organic compounds, Nitates, Nitrites, Phosphorus, Turbidity, Coliforms, Disinfection.
Identifiers: *McAlpine Pool(Ohio River).

Wastewater discharges into the McAlpine Pool reach of the Ohio River are comparatively small but tend to retard recovery of the river from effects of the Cincinnati area waste load. Waste discharges from municipal and industrial sources were not enough to cause the low dissolved oxygen problems observed, although waste treatment was inadequate in several cases. No cause and effect relationships were established between any waste discharge and low oxygen levels. Low reaeration rates in sluggish impoundments caused little oxygenation. Dissolved oxygen levels increased downstream for 25 miles, then declined downstream to McAlpine Dam. This trend correlated with factors affecting reaeration: river velocity and cross-sectional area. Total organic carbon, ammonia, and the five-day BOD profiles were similar and inversely proportional to nitrite-nitrate concentrations. Most of the oxygen demand appeared due to ammonia oxidation. Phosphorus concentrations were essentially constant. Specific conductance (dissolved solids) and pH values were within acceptable limits. Turbidity gradually declined through the McAlpine Pool. Coliform counts were excessive in certain areas. It is recommended that all municipal and industrial sanitary waste discharges receive adequate secondary treatment and disinfection. Upstream water sources, especially in the Cincinnati area, must provide better waste treatment; nitrification will probably be necessary. (Buchanan-Davidson--Wisconsin)
W75-08997

A WATER QUALITY INVESTIGATION OF THE CODORUS CREEK WATERSHED,
Environmental Protection Agency, Philadelphia, Pa. Field Investigation Section.
E. A. Kaeufer.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-227 635, $5.25 in paper copy, $2.25 in microfiche. Report March 1972. 119 p, 12 fig, 11 tab, append.

Descriptors: *Sewage districts, *Water quality, *Watersheds(Basins), *Pennsylvania, *Baseline studies, Self-purification, Water quality control, Waste water treatment, Agricultural runoff, Industrial wastes, Municipal wastes, Waste assimilative capacity, Eutrophication, Watershed management, Water utilization, Metals, Coliforms, Sewage treatment, Water pollution sources, Sewage effluents, Drainage area, Effluents, Water quality standards, Nutrients, Physical properties, Chemical properties, Biological properties.
Identifiers: *Codorus Creek Basin(Pa), York County(Pa).

A water quality study of the Condorus Creek Watershed in York County, Pennsylvania, a subbasin of the Susquehanna River, was made to establish a wastewater management plan. The watershed has a drainage area of 294 square miles and its waters are used for water supplies, recreation, treated waste assimilation, and power. There are forty reported industrial pollution sources and six municipal wastewater treatment facilities. The seven wastewater discharges sampled did not comply with effluent standards established by the Pennsylvania Implementation Plan (December 1967). Concentrations of toxic materials exceeded state water quality standards and were of the type normally found in industrial discharges. Nutrient concentrations exceeded levels which stimulate growth of algae and aquatic weeds and promoted eutrophication but stream discoloration, caused by effluent discharges from a paper company, limited light penetration and retarded aquatic plant growth. High counts of indicator microorganisms suggested inadequate chlorination of treatment plant effluents, direct discharges from domiciles, and livestock waste discharges. Physical, chemical, biological, and bacteriological information indicated that the Main and West Branches of Codorus Creek and the major tributaries of Oil and Mill Creeks were polluted with municipal and industrial wastewater discharges and agricultural runoffs. (Buchanan-Davidson--Wisconsin)
W75-08998

LIMNOLOGY OF WESTERN SPRINGS, AUCKLAND, NEW ZEALAND,
Kansas Univ., Lawrence. Dept. of Botany.
I. M. Jonhstone.
N Z J Mar Freshwater Res, Vol 6, No 3, p 298-328, 1972, Illus.

Descriptors: *Limnology, *Primary productivity, Springs, Surveys, Lakes, Ecosystems, Seasonal, Eutrophication, Water pollution effects.
Identifiers: Auckland, *New Zealand(Western Springs), Urban lakes, *Macrophytes.

A limnological survey over 12 mo. was made of Western Springs, a small urban lake which has had an explosive growth of macrophytes in recent years. Seasonal data given for the lake include physical, chemical and biological factors. These are presented in an attempt to elucidate the reasons for the very high primary productivity exhibited by this ecosystem.--Copyright 1973, Biological Abstracts, Inc.
W75-09000

INHIBITION OF DIATOM PHOTOSYNTHESIS BY GERMANIC ACID: SEPARATION OF DIATOM PRODUCTIVITY FROM TOTAL MARINE PRIMARY PRODUCTIVITY,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, and A. N. Dodson.
Marine Biology, Vol 27, p 11-19, 1974. 2 fig, 8 tab, 29 ref.

Descriptors: *Marine algae, *Diatoms, *Photosynthesis, *Inhibitors, Primary productivity, Phytoplankton, Silica, Oceans, Coasts, Measurement.
Identifiers: *Germanic acid.

The focus of this study was to demonstrate specific inhibition by germanic acid of photosynthetic carbon fixation by diatoms in short-term experiments where growth would be minimal and to show how germanic acid might be used in separating diatom productivity from total carbon dioxide uptake in routine marine primary productivity measurements. Germanic acid inhibited photosynthetic radioactive carbon dioxide uptake by marine diatoms without affecting other phytoplankton. Inhibition was not complete with 20 mg germanium/l or when cultures were incubated for extended periods of time. Decrease in photosynthesis due to germanic acid was independent of diatom growth stage. With 0.5-1.0 mg germanium/l, the degree of inhibition was dependent on the silicic acid concentration. At 5-10 mg germanium/l, inhibition was not affected by silicic acid concentrations as high as those in the sea. In cultures of diatoms and marine flagellates, reduction in radioactive carbon dioxide fixation due to germanic acid was used to calculate the proportion of diatom photosynthesis to total photosynthesis; calculated proportions agreed with actual proportions. Germanic acid inhibition was used to estimate the percent of diatom photosynthesis in a natural marine community and compared with the actual diatom portion of the crop. (Buchanan-Davidson--Wisconsin)
W75-09001

PIGMENT CYCLES IN TWO HIGH-ARCTIC CANADIAN LAKES,
J. Kalff, H. E. Welch, and S. K. Holmgren.

Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 250-256, 1972. 5 fig, 12 ref.

Descriptors: *Distribution, *Lakes, *Phytoplankton, *Chlorophyll, *Pigments, *Canada, Arctic, Oligotrophy, Water pollution effects, Solar radiation, Seasonal, Polar regions.
Identifiers: Char Lake(Cornwallis Island), Meretta Lake(Cornwallis Island).

Oligotrophic Char Lake near Resolute Bay, Cornwallis Island, N.W.T. is being intensively studied. Less comprehensive work is done on nearby organically polluted Meretta Lake. Chlorophyll-a concentrations were determined fluorometrically over a two year period in both of these high arctic lakes. Unpolluted Char Lake contained extremely low average water column concentrations of pigment, ranging between a low of 0.13 mg chl. a/cu m during the polar night and a high of 0.69 mg/cu m in May. Polluted Meretta Lake pigment concentrations fluctuated between 3 and 5 mg/cu m during most of the growing season but peaked with 24.0 mg/cu m in July 1970 after thawed sewage and waste water entered the lake. Pigment concentrations in Char Lake surface waters started to rise shortly after the end of the polar night when the photosynthetically available energy flux under the ice was no greater than 0.1 cell/sq cm/day. Char Lake pigment concentrations started to decline shortly before the onset of the polar night and continued to do so until the sun returned but pigment levels per unit biomass were greatest during the polar night. (Jones-Wisconsin)
W75-09002

EVALUATION OF PRIMARY PRODUCTION PARAMETERS IN LAKE KINNERET (ISRAEL),
W. Rodhe.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 93-104, 1972. 6 fig, 1 tab, 5 ref.

Descriptors: *Primary productivity, Phytoplankton, Photosynthesis, Model studies, Depth, Light penetration, Seasonal, Lakes.
Identifiers: *Lake Kinneret(Israel), Peridinium.

The basin of Lake Kinneret, 210 m below sea level, is of very simple shape, but its water masses often display considerable differences in their properties and behavior. Thus the phytoplankton distribution is extremely irregular and patchy during the Peridinium blooms in spring and early summer. Simplified procedures have been attempted in Lake Kinneret, where weekly exposures were carried out from March 1969 to September 1970. Application of Talling's photosynthetic model offers several opportunities to calculate areal assimilation rates, provided the phytoplankton is fairly uniformly distributed throughout the trophogenic layer. If so, only two parameters are needed: a certain depth of the photosynthetically most efficienc component and the maximal assimilation rate, at optimal light intensity. In the Kinneret, the level of 15% of incident blue light (not the deeper penetrating green light) and the rate of a mixed sample, suspended at 50% of incident most efficient component were found to satisfy the model. In this way, synoptical data could be obtained conveniently from up to 8 stations dispersed over the lake. Validity tests of the simplified procedures are presented, and the limitations of the short-cut approach are discussed. (Jones-Wisconsin)
W75-09003

BACTERIAL PRODUCTIVITY OF A HIGH MOUNTAIN LAKE,
Innsbruck Univ. (Austria). Inst. of Zoology.
M. Tilzer.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 188-196, 1972. 5 fig.

Descriptors: *Bacteria, *Productivity, *Lakes, Alpine, Secchi disks, Photosynthesis, Turbulence, Phytoplankton, Stratification, Algae, Cycles, Elevation, Deep water.
Identifiers: Mountain lakes, *Vorderer Finstertaler See(Austria).

The importance of bacterial productivity in the production process of lakes had been emphasized. Bacteria are not only the final stage of the food chain but also play a considerable role for subsequent producers. The Vorderer Finstertaler See, Austria, is situated in the Central Alps at an elevation of 2237 m asl, above the timber line. Photosynthesis reaches the bottom of the lake due to the high transparency of the water. Bacterial cell numbers as determined by direct counts on membrane filters were unexpectedly high. As a consequence of the high turbulence of the water, bacterial biomass is almost unstratified, while phytoplankton, composed predominantly of motile forms, shows distinct vertical stratification. In the mean, heterotrophic carbon dioxide uptake amounts 35% of photosynthesis but is extremely high during winter and low after ice thaw. During the winter, heterotrophic productivity is due to bacteria only, while in summer algae also seem to be of some importance. This can be explained by the differences in the uptake mechanisms for organic substances. There is experimental evidence of a close connection between autotrophic and heterotrophic processes during the day which makes possible short-way cycles of nutrients. (Jones-Wisconsin)
W75-09004

METABOLISM OF THE DOMINANT AUTOTROPHS OF THE NORTH AMERICAN GREAT LAKES,
J. Verduin.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 105-112, 1972. 3 fig, 5 tab, 13 ref.

Descriptors: *Productivity, *Metabolism, *Dominant organisms, *Great Lakes, Photosynthesis, Respiration, Littoral, Biological communities, Phytoplankton, Shallow water, Deep water, Euphotic zone, Growth rates.

Photosynthetic and respiratory rates for both the littoral zone communities and the phytoplankton communities of the Great Lakes are presented. An interesting contrast among the lakes and between enriched near-shore areas and offshore areas is revealed. Lake Superior with its soft water and its low nutrient supply shows the lowest yields. Lake Michigan's yields are about 3-fold higher. Lake Huron exhibits a photosynthetic yield intermediate between that of Michigan and Superior. As the water enters western Lake Erie they receive spectacular nutrient influx from Detroit, and from agricultural and urban areas of southeastern Michigan and northwestern Ohio. The western basin yields are similar to those of enriched nearshore areas of the upper lakes such as Green Bay, Wisconsin and Saginaw Bay, Michigan. The last lake in the system, Ontario, exhibits yields closely similar to eastern Lake Erie. The filamentous algal communities found on the shores exhibit photosynthetic yields of about 50 micromoles of carbon dioxide absorbed per ml of algal biomass per hour, regardless of species composition or of locality, excepting western Lake Erie. Respiration rates of the filamentous community were about 6 micromoles of carbon dioxide evolved per ml of algae/hour except in western Lake Erie, where the rate was about doubled. (Jones-Wisconsin)
W75-09005

THE KINETICS OF EXTRACELLULAR RELEASE OF SOLUBLE ORGANIC MATTER BY PLANKTON,
G. W. Saunders, Jr.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, P 140-146, 1972. 6 fig, 5 ref.

Descriptors: *Kinetics, *Organic matter, *Plankton, Phytoplankton, Lakes, Light intensity, Diurnal, Carbon, Bicarbonates, Transpiration, Biochemistry, Photosynthesis.
Identifiers: *Soluble organic matter.

The kinetics of extracellular release of soluble organic matter by phytoplankton communities in different types of lakes were examined under conditions approximating natural changes in light intensity during a 24-hour period from sunrise to sunrise. Lake water was placed in gallon bottles to which radioactive sodium bicarbonate was added. The bottles were resuspended at the depth of sampling and were shaken and sampled frequently from sunrise of one day until sunrise of the following day. Radioactivity as soluble organic matter was determined by acidifying the filtrate, degassing, and drying the soluble organic matter in cupped plates. The net cumulative soluble organic carbon accumulation is a result of the differential between the release rate of soluble organic matter by the phytoplankton and the assimilation rate of that material by the bacterial community. There are three patterns of extra-cullular release that occur. The data presented here are suggestive of a continuous spectrum of release patterns ranging from simple organic molecules to large polymers and from release throughout the day to release only during daylight. Any specific pattern will depend on environmental conditions, the structure of the phytoplankton community, and the growth states of the phytoplankton populations in that community. (Jones-Wisconsin)
W75-09007

ESTIMATION OF AQUATIC ECOSYSTEM PARAMETERS,
R. A. Parker.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 257-263, 1972. 3 fig, 1 tab, 9 ref.

Descriptors: *Estimating, *Ecosystems, *Mathematical models, Physicochemical properties, Biological properties, Equations, Systems analysis, *Canada.
Identifiers: *Kootenay Lake(British Columbia), Parameter estimation.

The development of parameter estimation techniques which rely on field data to optimize model fit is presented and was prompted in part by prior study of Kootenay Lake, British Columbia. This lake has been subject to low level nutrient enrichment for nearly two decades (primarily inorganic phosphate effluent from a fertilizer plant as well as occassional influxes of nitrate from other sources). Physicochemical data included seasonal changes in river inflow and outflow, inorganic phosphate concentration in the river, temperature and inorganic phosphate concentration in the lake, nitrate and solar radiation. Of the biological components, phytoplankton were subdivided into two groups based primarily on seasonal occurrence; zooplankters were divided into cladocerans and copepods. Their growth rates in the model were determined by grazing activity modified by a reduction in the presence of large quantities of algae. Natural mortality and displacement were included as well as predation. The model represents a compromise between reality and mathematical expediency. The differential equation model utilized for simulation is described; it involves 18 parameters. Simulation output is vastly improved over that produced by the earlier model. (Jones-Wisconsin)
W75-09008

THE BENTHIC CARBON BUDGET OF A SOUTHERN MICHIGAN MARL LAKE,
P. H. Rich, and R. G. Wetzel.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 157-161, 1972. 3 fig, 2 tab.

Descriptors: *Productivity, *Benthos, *Carbon, *Detritus, *Lakes, *Michigan, Respiration, Seasonal, Submerged plants, Aquatic plants, Marl, Bottom sediments, Food chains, Periphyton.
Identifiers: *Carbon budget, *Lawrence Lake(Mich).

Assuming that benthic production and permanent loss of carbon to the sediments are known, rates of benthic respiration during decomposition of detritus determine the efficiency of detrital production and the ultimate amount of detrital material available to the open water community may be estimated by the difference. Measurements made of the benthic production of Lawrence Lake, Michigan, a small, hardwater lake, are described. Benthic production was partitioned into macrophyte productivity, epiphytic productivity, sedimentation of phytoplankton, epipelic productivity and terrestrial inputs. Losses of carbon from the benthos were partitioned into loss to the permanent sediments, loss as respiration of carbon dioxide, and utilization of detritus. Maximal values for benthic respiration were found in the spring and seasonal variations corresponded closely with littoral and pelagic productivity. The vertical variations in rates of benthic respiration correlated directly with the biomass production curves of submersed macrophytes in all cases during the ice-free period. The results of the carbon budget for Lawrence Lake gave a positive balance and indicate that 8.9 g C sq m/yr leave the benthos of this lake as a detrital contribution to the open water community. (Auen-Wisconsin)
W75-09009

THE BIOLOGICAL CYCLE OF MOLYBDENUM IN RELATION TO PRIMARY PRODUCTION AND WATERBLOOM FORMATION IN A EUTROPHIC POND,
H. J. Dumont.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 84-92, 1972. 3 fig, 2 tab, 28 ref.

Descriptors: *Trace elements, Cycles, *Molybdenum, *Primary productivity, *Eutrophication, *Cycling nutrients, Freshwater, Food chains, Cyanophyta, Europe.
Identifiers: *Lake Donk(Belgium).

The molybdenum needs of aquatic environments, the dynamics of this element in Lake Donk, Belgium and its flow through the food chain were studied. In feshwater, soluble Mo is usually present at sub-microgram/l levels. The phytoplankton absorbs considerable quantities of Mo from solution, without really concentrating it. The zooplankton, supposedly stocking Mo with its algal food contains quantities one or two orders of magnitude lower than pure blue-green cultures. This indicates an active and very rapid recreation of the element, perhaps because high levels might act as poison. This rapid recretion was crucial in keeping the element in solution. The phenomenon, in which the ferro/ferri system operates apparently governs the molybdenum system as well. If Lake Donk is taken as a yardstick, it would appear that, in order to obtain top-production (all other factors, except light, not being limiting), 10 mg Mo/sq m would approximately meet the algal needs (5 micrograms/l for a depth of 2 m in Lake Donk). A trace element deficiency, and not impossibly a Mo deficiency, might help to explain causality of blue-green water blooms ascribed to an abundant N and P supply along. (Jones-Wisconsin)
W75-09010

THE RADIATION BALANCE OF LAKES ON THE TERRITORY OF THE USSR,
T. V. Kirillova, and N. P. Smirnova.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 554-562, 1972. 4 fig, 2 tab.

Descriptors: *Albedo, *Solar radiation, *Lakes, *Estimating, Europe, Equations, Light penetration.
Identifiers: *Radiation balance, *USSR.

The solar radiation reaching lake surfaces is the energy source of all the processes occurring in the lakes. It determines the thermal regime, the evaporation from the lake surface and provides for photosynthesis and life in the water masses. Different formulae are often used for estimation of radiation balance and its components over water surfaces. Monthly charts of radiation balance are derived for the land on the basis of observation data from a network of actinometric stations. The main differences between water and land radiation balance values are determined from the differences in albedo and surface temperature values. A formula is given for the lake radiation balance calculation. In deriving the formula, the global radiations both over the lake and the land surfaces are considered to be equal and the difference in the effective radiation can be evaluated from the difference in the longwave radiation flows from the surface. The radiation balance in USSR lakes is estimated by two main factors: physicogeographical conditions and morphometric peculiarities. An attempt was made to evaluate changes in the radiation balance values in lakes of different depths and sizes. (Jones-Wisconsin)
W75-09012

HYDROLOGICAL FEATURES OF LAKE ONEGA IN THE ANNUAL CYCLE,
T. I. Malinina.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 537-541, 1972. 2 tab.

Descriptors: *Hydrology, *Lakes, *Cycles, Europe, Hydrogeology, Clay, Mud, Sands, Sedimentation, Silts, Oxidation-reduction potential, Hydrogen ion concentration, Carbon, Nitrogen, Trace elements, Phosphorus, Iron, Copper, Heat balance, Rainfall, Solar radiation, Productivity, Chemical properties, Physical properties.
Identifiers: *Lake Onega(USSR).

Lake Onega, USSR is the second largest lake in Europe. Average depth is 30 m, the maximum depth is 120 m. For the most part, the bottom is covered with claylike mud overlying limnoglacial clays, mainly banded clays. The bands become narrower towards the surface due to the decrease of the sedimentation rate after the glacier had melted. The southern part of the lake is covered with sand; the sublittoral zone abounds in silts; the bottom of profundal zone is covered with a very fine layer of clayey mud. There is the tendency to common concentration of carbon, phosphorus, iron and copper in the sediments. The climate of the territory is characterized by a mean annual air temperature of 1.9C, average rainfall of 450 mm and an ice-free period of about 200 days. The annual period of sunshine is on the average 1600 hrs, which corresponds to a value of solar radiation of 74.2 kcal; 73% of the annual solar radiation occurs between May and October. The natural conditions of Lake Onega, its thermal regime, its dynamics, and its hydrochemical peculiarities exert considerable influence upon the composition of the organisms in the lake and its biological productivity. (Jones-Wisconsin)
W75-09013

SEASONAL CHANGES IN DISSOLVED ORGANIC NITROGEN IN SIX MICHIGAN LAKES,
B. A. Manny.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 147-156, 1972. 10 fig, 2 tab, 15 ref.

Descriptors: *Fluctuations, *Seasonal, *Nitrogen cycle, *Lakes, Michigan, Ultraviolet radiation, Hardness(Water), Nitrates, Nitrites, Aquatic plants, Primary productivity, Chlorophyta, Chrysophyta.
Identifiers: *Dissolved organic nitrogen, Particulate organic nitrogen, Lawrence Lake(Mich), Wintergreen Lake(Mich), Purdy Lake(Mich), Cassidy Lake(Mich), Duck Lake(Mich), Gull Lake(Mich).

Dissolved organic nitrogen (DON) occurs in lakes in concentrations six times higher than particulate organic nitrogen which can be measured by UV combustion. Seasonal measurements of UV-labile dissolved organic nitrogen (LDON) and UV-refractory dissolved organic nitrogen (RDON) in six hardwater lakes are compared. During combustions of water from oligotrophic Lawrence and eutrophic Wintergreen Lakes, 60-90% of final LDON in both lakes was recovered after 0.5 to 1.0 hr irradiation but less than 75% of final RDON appeared during the same period. DON in Lawrence Lake was most UV-labile during late June, August and September-October but more UV-refractory during mid-May and December-January when a progressive decrease in UV-lability occurred. LDON in Wintergreen Lake was always present at concentrations 5-10 times those present in Lawrence Lake and was generally more UV-labile than LDON in Lawrence throughout the year. Seasonal changes in the UV-lability of LDON and RDON in Wintergreen were apparently independent. Changes in LDON lability in Lawrence were unrelated to percentage reduction of nitrate to nitrite. Differences in DON content between lakes are likely related to the extent of macrophytic colonization and magnitude of allochthonous DON contributions relative to lake volume. (Jones-Wisconsin)
W75-09014

BIOLOGICAL ASPECTS ON THE LARGE LAKES IN SOUTH SWEDEN,
T. Willen.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 370-378, 1972. 7 fig, 1 tab, 12 ref.

Descriptors: *Biological communities, *Lakes, Phytoplankton, Nutrients, Diatoms, Eutrophication, Cyanophyta, Chrysophyta, Oligotrophy, Chlorophyll, Aquatic plants, Varieties, Benthic fauna, Fish, Fisheries, Europe.
Identifiers: Vanern Lake(Sweden), Vattern Lake(Sweden), Malaren Lake(Sweden), Hjalmaren Lake(Sweden), Cryptomonads, *Sweden.

The increasing input of nutrients to the large Swedish lakes (Vanern, Vattern, Malaren and Hjalmaren) has caused primarily changes of the qualitative composition and the quantities of phytoplankton. Quantitatively important taxa from Lake Malaren show the predominance of diatoms and cryptomonads in most parts with a marked addition of cyanophytes in more polluted areas. The phytoplankton of Lake Vattern is still characterized by taxa indicating an oligotrophic state. Different aspects may be due to the correlations between nutrient supply and primary production. A mapping of the macrophyte vegetation of these four lakes is taking place by means of aerial photography although it is impossible to distinguish exactly the different genera on the photos. Cold stenothermal animals, indicating relatively clean water, occur in Lake Vanern (except in polluted areas), Lake Vattern and to some extent in the central part of Lake Malaren. The occurrence of different fish species and the total catch has undergone considerable changes in the large lakes. In Lake Malaren salmon trout was rather frequent right up to the beginning of the twentieth century; now only single specimens occur in this lake. (Jones-Wisconsin)
W75-09015

INFLUENCE OF COPPER ON PHOTOSYNTHESIS OF DIATOMS WITH SPECIAL REFERENCE TO AN AFTERNOON DEPRESSION,
E. S. Nielsen, and S. Wium-Andersen.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 78-83, 1972. 5 fig, 8 ref.

Descriptors: *Carbon radioisotopes, *Copper, *Photosynthesis, *Diatoms, Biorhythms, Measurement, Inhibition.
Identifiers: Nitzschia palea.

Effect of small copper concentrations on photosynthesis measurements of algal growth under conditions of a shift between light and dark periods is considered. Some manufacturers

prepare C-14 ampoules for measuring primary production using ordinary distilled water which averaged 260 micrograms Cu/l. Some productivity measurements are discussed in light of possible poisoning by Cu derived from C-14 ampoules. In a Cu-free medium at light-saturation, diatom, Nitzschia palea, was grown at 20C, illumination intensity 4.3 m W sq cm, and a programmed light and dark regimen of 12 hours light and 12 hours dark. Photosynthesis rate increased during whole light period, but immediately after beginning of dark period, the rate decreased showing an absolute minimum about two to four hours in dark period. Rate increased again reaching at transit to new light period about the same value as found during the last hours of the light period. Simultaneously parallel experiments were made in which before each experiment, 6 micrograms/l Cu were added. Photosynthesis depression due to Cu seems correlated with cell division. There is ample evidence to suggest that sometimes C-14 ampoules--not made by The International Agency--have contained sufficient Cu to affect experiments. (Jones-Wisconsin)
W75-09016

A COMPARISON OF SEDIMENT OXYGEN UPTAKE, HYPOLIMNETIC OXYGEN DEFICIT AND PRIMARY PRODUCTION IN LAKE ESROM, DENMARK,
B. T. Hargrave.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 134-139, 1972. 2 fig, 1 tab, 17 ref.

Descriptors: *Lake sediments, *Oxygen demand, *Absorption, *Hypolimnion, *Primary productivity, Oxygen sag, Microorganisms, Oxidation, Mud-water interfaces, Europe, Seasonal.
Identifiers: *Lake Esrom(Denmark).

It appears probable that hypolimnetic oxygen deficits are caused by oxygen uptake both at the sediment surface and in the water. The partitioning of oxygen uptake between mud and free water should give useful information about energy flow through bottom communities. Reduced compounds produced by the metabolic activity of microorganisms cause chemical oxidation and total sediment oxygen uptake must be corrected in measurements before aerobic decomposition processes occurring within sediments can be quantified. Cores of soft profundal mud were taken from the middle of Lake Esrom (20 m depth) during 1970 to determine actual rate of sediment oxygen uptake. Changes in dissolved oxygen in water over sediment cores after incubation for 3-4 hours in the dark were taken as a measure of sediment oxygen consumption. Chemical oxygen uptake by sediment, measured in the presence of 1% buffered formalin varied between 10 and 30% of total uptake at various times of the year. No consistent pattern occurred and an average value of 20% has been assumed in calculating biological respiration. Calculated rates of oxygen consumption from hypolimnetic oxygen deficits, both under ice cover and during summer stagnation, compare very closely with direct measures of sediment oxygen uptake. (Jones-Wisconsin)
W75-09017

PHYTOPLANKTONIC PRIMARY PRODUCTION DURING THE SUMMER STAGNATION IN THE EUTROPHICATED LAKES LOVOJARVI AND ORMAJARVI, SOUTHERN FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
V. Ilmavirta, K. Ilmavirta, and A-L. Kotimaa.
Annales Botanici Fennici, Vol 11, No 2, p 121-132, 1974. 14 fig, 5 tab, 42 ref.

Descriptors: *Primary productivity, *Eutrophication, *Energy transfer, Lakes, Biomass, Chemical properties, Varieties, Thermal stratification, Hypolimnion, Epilimnion, Meromixis, Seasonal, Electrolytes, Conductivity, Cyanophyta, Diatoms, Dominant organisms, Oxygen, Hydrogen ion concentration, Europe.
Identifiers: *Finland, *Lake Lovojarvi(Finland), *Lake Ormajarvi(Finland), *Lake Paajarvi(Finland).

Primary production, biomass, species composition, and chemistry of Lakes Lovojarvi and Ormajarvi in southern Finland were studied during summer stagnation eutrophic and thermally stratified. Lake Lovojarvi showed meromictic features, earlier summer stagnation, a much greater increase in electrolytic conductivity and potassium permanganate consumption, and higher concentrations of nitrogen, phosphorus, calcium, and magnesium in the hypolimnion. The chemical properties were nearly the same in the epilimnion of both lakes. Primary production was relatively high. During the period of high primary production, oxygen concentration increased, surface layer pH increased, and inorganic carbon content decreased very little in Lovojarvi and could be used to estimate the lake productivity stage. Total nitrogen and phosphorus could not be correlated with seasonal variations in phytoplankton production. In both lakes production was maximum when stratification was most stable, and decreased towards autumn. Biomass could be correlated with production. Cyanophytes were predominant during high production (2/3 of total biomass) and diatoms were low. Phytoplanktonic production was high compared to Paajarvi. Productive ability of Ormajarvi was higher than that of Lovojarvi. The production/biomass ratio and renewal time varied widely. (Buchanan-Davidson--Wisconsin)
W75-09018

PHYTOPLANKTON ENRICHMENT EXPERIMENTS AND BIOASSAYS IN NATURAL COASTAL SEA WATER AND IN SEWAGE OUTFALL RECEIVING WATERS OFF SOUTHERN CALIFORNIA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, D. L. R. Seibert, and A. N. Dodson.
Estuarine and Coastal Marine Science, Vol 2, p 191-206, 1974. 8 fig, 4 tab, 26 ref. NSF GA 27545 and GA 32529X.

Descriptors: *Limiting factors, *Phytoplankton, *Sea water, *Outfall sewers, *Bioassay, *California, Inhibition, Pacific Coast Region, Nitrogen, Eutrophication, Growth rates, Fluorescence, Red tide, Upwelling.

Nutrient enrichment experiments using diatoms and a dinoflagellate with near-shore Southern California surface water showed that nitrogen was the principal nutrient limiting phytoplankton growth. Secondary limitations were shown for phosphate, silicate, iron, trace metals (molybdenum, zinc, manganese, cobalt, copper) and vitamins (vitamin B12, biotin, thiamin). Addition of Point Loma sewage was stimulatory and a complete nutritive additive. Bioassays showed that receiving waters were sometimes stimulatory and at other times inhibitory to algal growth. In some cases there was little or no growth, even on enrichment; this inhibition varied with the test organism, season, and water sample tested. Red tides were probably not caused by sewage enrichment but by any process (advection or upwelling) which enriched surface sea waters. Water near outfalls was eutrophic with a balance between inhibition and stimulation of phytoplankton by sewage input. These studies used in vivo fluorescence to measure algal growth. A comparison of growth rates obtained by fluorescence with cell division rates showed that fluorescence was rapid, sensitive, could be used with all types of phytoplankton, and measured chlorophyll increase, but may vary with light intensity and cellular nutritional status. (Buchanan-Davidson--Wisconsin)
W75-09019

ALGAE IN ALKALINE WATERS OF KANEM (TCHAD): I, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
A. Iltis.
Cah ORSTOM Ser Hydrobiol. Vol 6, No 3/4, p 173-246, 1972, Illus, English summary.

Descriptors: *Algae, Phytoplankton, Lakes, Ponds, Cyanophyta, Chlorophyta, Diatoms, Pyrrophyta, Euglenophyta, *Alkaline water, Salinity.
Identifiers: Chad, Cryptophyta, *Tchad(Kanem).

Samples of phytoplankton collected in 22 alkaline ponds and lakes have been qualitatively analyzed. The salinity varies from 1- > 100 g/l according to the stations. Five hundred fourteen taxa were determined; among them, 97 Cyanophyta, 52 Euglenophyta, 209 diatoms, 149 Chlorophyta and 7 Pyrrophyta and Cryptophyta were presented.--Copyright 1974, Biological Abstracts, Inc.
W75-09020

ECOLOGY OF BLUE-GREEN ALGAL VIRUSES,
North Carolina Univ., Greensboro. Dept. of Biology.
R. E. Cannon, M. S. Shane, and E. DeMichele.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol 100, No EE6, p 1205-1211, 1974. 19 ref.

Descriptors: *Algal control, *Ecological distribution, *Cyanophyta, *Viruses, Hosts, Water pollution, *Delaware, Sea water, Salinity, Protozoa, Reviews, Algae.
Identifiers: LPP-group Cyanophages, Christina River(Dela), Plectonema boryanum, Hartmanella glebae, Amoeba.

Studies of ecology of blue-green algal viruses, specifically LPP-group, are reviewed. LPP-viruses can be isolated from both artificial and natural aquatic environments and are isolated only from organically polluted areas, according to Delaware's Christina River survey. The LPP-cyanophage has been found in marine environments and laboratory study has shown that virus and host can interact at high salinity. Laboratory investigations have demonstrated LPP-viruses can lysogenize their host blue-green alga, Plectonema boryanum, when the alga is 'stressed' by antibiotics, heavy metals, or nutrient limitation, that may occur in natural environment. An amoeba, Harmanella glebae, has been isolated which appears to act as reservoir for the LPP-cyanophage while feeding on infected Plectonema filaments. The nonblooming nature of this blue-green alga might be hypothetically explained through control of algal populations with temperate viruses via the lysis-lysogeny decision in conjunction with a protozoan reservoir that would move the virus efficiently to better grazing areas. Cyanophages may control blue-green algal blooms and may serve as more reliable indicators of organic and cultural pollution than other microorganisms. (Jones-Wisconsin)
W75-09021

SIMULATION OF URBAN RUNOFF, NUTRIENT LOADING, AND BIOTIC RESPONSE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
D. D. Huff, J. F. Koonce, W. R. Ivarson, P. R. Weikv, and E. H. Dettman.
Eastern Deciduous Forest Biome-IBP Contribution No. 114, (1974). 53 p, 25 fig, 4 tab, 14 ref. NSF AG-199, 40-193-69.

Descriptors: *Ecosystems, *Model studies, *Urban runoff, *Nutrients, *Biota, Shallow water, Eutrophication, Lakes, Watersheds(Basins), Precipitation(Atmospheric), Groundwater,

*Wisconsin, Hydrology, Productivity, Path of pollutants.
Identifiers: *Lake Wingra(Wis).

Through orderly progression of process model synthesis, testing, and new synthesis, a solid model structure can be built and extended for simulating whole ecosystem response to natural and man-made perturbations. Multi-disciplinary research and team modeling efforts have provided the opportunity to conduct detailed whole ecosystem simulation studies. The lake water balance was analyzed, followed by estimated nutrient loading from precipitation, dryfall, runoff, and groundwater flow. Simulations of lake response, from April to September, 1970, were compared with observations. In a first attempt to link terrestrial and aquatic ecosystem models, a six month period was selected for simulating both water and nutrient loading from the terrestrial system and the associated response of the Lake Wingra, Wisconsin ecosystem. Hydrologic simulations appear equally as accurate as field measurements, and serve as reliable means for estimating nutrient loading from storm drains in an urban watershed. The simulated response to a wide range of nutrient influx indicates that Lake Wingra is less sensitive to nutrient influx than to regeneration within the pelagic system. This implies that already productive lake systems will be less responsive to nutrient diversion than those with lower productivity. (Jones-Wisconsin)
W75-09022

THE PHOSPHORUS BUDGET OF CAMERON LAKE, ONTARIO: THE IMPORTANCE OF FLUSHING RATE TO THE DEGREE OF EUTROPHY OF LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
P. J. Dillon.
Limnology and Oceanography, Vol 20, No 1, p 28-39, 1975. 8 fig, 6 tab, 31 ref.

Descriptors: *Phosphorus, *Discharge(Water), Depth, *Trophic level, *Canada, Lakes, *Eutrophication, Mathematical models, Nutrient removal.
Identifiers: *Flushing rate, *Cameron Lake(Ontario), Phosphorus budget, Vollenweider's trophic model.

Studies of the total phosphorus budgets of several lakes in southern Ontario showed that a number of lakes were not accurately depicted by Vollenweider's phosphorus loading-mean depth relationship. Cameron Lake, described here, is an example of such a lake. Cameron Lake is clearly not a highly eutrophic lake, as the simple model would suggest. The reason for this discrepancy is the high flushing rate--the lake's water volume is replaced 13.8 and 18.9 times per year. The total phosphorus budget of this lake is described for two 12-month periods. Although the phosphorus loadings were high (1.70 and 2.21 g/sq m/yr) the lake is not eutrophic because the high flushing rate counteracts the high loading. A plot with the phosphorus loading, the retention coefficient of phosphorus in the lake, and the hydraulic flushing rate, vs. the mean depth, is suggested as a means of relating lake trophic state to phosphorus loading. This formulation accurately predicted that nearby Four Mile Lake would be almost identical to Cameron Lake in terms of degree of eutrophy despite the fact that Four Mile Lake's phosphorus load is 20 times less than that of Cameron Lake. (Jones-Wisconsin)
W75-09023

SOME RELATIONSHIPS BETWEEN ALGAL STANDING CROP, WATER CHEMISTRY, AND SEDIMENT CHEMISTRY IN THE ENGLISH LAKES,
Minnesota Univ., Minneapolis. Dept. of Botany.
E. Gorham, J. W. G. Lund, J. E. Sanger, and W. E. Dean.
Limnology and Oceanography, Vol 19, No 4, p 601-617, 1974. 13 fig, 5 tab, 45 ref. NSF 2448 and GB 6018.

Descriptors: *Trophic level, *Algae, *Standing crops, *Water chemistry, *Lake sediments, Pigments, Cyanophyta, Ions, Calcium, Bicarbonates, Vitamins, Sulfur, Agricultural runoff, Carbon, Nitrogen, Cycling nutrients.
Identifiers: *English Lake District.

This investigation reveals that algal standing crops vary significantly with a number of environmental properties which themselves are interrelated. For example, the sediments of productive lakes are much higher in both sulfur and sedimentary carotenoids than the sediments of unproductive lakes. Estimates of standing crop, derived approximately from algal counts, have been used to separate the English Lakes into three groups of low, intermediate, and high fertility. The fertile lakes are proportionally poorer than the infertile lakes in micro-algae, but richer in 'large algae' and Cyanophyta. The fertile lakes are richer in dissolved ions, especially calcium and bicarbonate, in filter-passing and particulate vitamin B-12, in sedimentary sulfur, and in sedimentary chlorophyll derivatives and carotenoids. The relationship noted by Pearsall between lake fertility and agricultural activity is shown by a strong correlation between algal standing crop and the percentage of the drainage basin under cultivation. Sediment ratios of carbon to sulfur and of chlorophyll derivatives to carotenoids decline with increasing fertility, whereas the ratio of carbon to nitrogen shows little change. This study lends support to the use of sedimentary pigments as indices to lake productivity. The pigment data also indicate that much of the organic matter in sediments of productive lakes comes from autochthonous sources within the lakes. (Jones-Wisconsin)
W75-09024

DISTRIBUTION OF BENTHIC INVERTEBRATES IN THE SOUTH END OF LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
S. C. Mozley, and W. P. Alley.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 87-96, 1973. 8 fig, 3 tab, 23 ref. FWPCA WP-00311.

Descriptors: *Ecological distribution, *Benthic fauna, *Invertebrates, *Lake Michigan, Water pollution effects, Oligochaetes, Amphipoda, Sediments, Habitats, Path of pollutants.

Large areas of the south end of Lake Michigan have been considered very polluted. Pollution-sensitive Amphipoda occur in large populations over much of the south end. Abundant Oligochaeta occur at stations 15 km away from major shoreline sources of pollution, while some stations near harbors and river mouths support few Oligochaeta, on the average. Very profuse oligochaetes, which are good evidence of pollution, occur sporadically at most stations shallower than 20 m. While the regional differences in average amphipod and oligochaete abundances between the central and southern parts of the lake indicate some deterioration of the south end, very few areas can definitely be called polluted on the basis of data now available. Irregular, high abundances of oligochaetes at many inshore stations suggest that polluted sediments are not evenly or permanently deposited at depths exposed to wave action and coastal currents, but are probably dispersed gradually over wide areas. The more pronounced regional differences occur between 9 and 40 m, which suggests that enriching materials from shoreline sources ultimately come to rest in a band which follows these depth contours. (Jones-Wisconsin)
W75-09025

CHEMICAL AND HYDROLOGICAL CHARACTERISTICS OF THE WISCONSIN-LAKE SUPERIOR DRAINAGE BASIN: EASTERN SECTOR,
Northland Coll., Ashland, Wis.
B. Goetz, L. Stadnyk, and D. Whisnant.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 243-251, 1973. 2 fig, 5 tab, 8 ref.

Descriptors: *Drainage basins, *Chemical properties, *Hydrology, *Lake Superior, *Wisconsin, Water quality, Michigan, Recreation, Hydrogen ion concentration, Water temperature, Chemical oxygen demand, Phosphates, Nitrates, Dissolved oxygen, Rivers, Streams, Forecasting, Nutrient removal, Sewage treatment, Drainage area.
Identifiers: *Phosphate loading, Bayfield Peninsula(Wis), Bad River Basin(Wis), Montreal River Basin(Mich).

The south shore region of Lake Superior bordering Wisconsin contains waters of the highest caliber which are a great asset to the developing recreation industry. This 1972 study investigated the water quality of the major streams and rivers between Bayfield and Hurley, Wisconsin emptying into the lake and projects the impact of certain anthropogenic activities as well of phosphate removal from sewage effluents of the two major cities in the area. Sampling points were established in ten major basins where pH, temperature, chemical oxygen demand, total soluble phosphate, nitrate, dissolved oxygen, and total coliform bacteria were determined. The water quality was found to be generally high with most dissolved oxygen levels above 75%. Phosphate concentrations were generally between 50 and 150 ppb, while most nitrate concentrations were below 500 ppb. The annual phosphate load to Lake Superior from these basins is around 187 metric tons. Installation of phosphate removal facilities at Ashland is not expected to have a significant effect on the load to Lake Superior but will decrease the load to Chequamegon Bay by 39%. (Auen-Wisconsin)
W75-09026

POSSIBLE ACCELERATED EUTROPHICATION THRESHOLDS IN THE GREAT LAKES RELATIVE TO HUMAN POPULATION DENSITY,
State Univ. Coll., Brockport, N.Y. Dept. of Biological Sciences.
F. J. Little, G. F. Bieber, T. J. Horst, and D. F. Brown.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 928-933, 1973. 4 fig, 4 tab, 13 ref.

Descriptors: *Eutrophication, *Great Lakes, *Human population, *Forecasting, Depth, Mathematical studies, Chemical properties, Fisheries, Areal, Volume, Watersheds(Basins), Regression analysis.

In environmental research today, the major variable is excluded except perhaps indirectly. That variable is people, relative to individual ecosystems of whatever size and complexity. Though 'people' constitute a difficult variable, virtually impossible to control, they are the common denominator which cannot be ignored. Great Lakes data of the 1800s through the mid-1960s were examined using elementary correlation, regression and simple observation. Data included populations, available chemical variables and fisheries. Population/square meter at mean depth yields highly significant, and more consistent results than population with respect to surface area or volume; a suggestive and significant all-lakes (less Lake Superior) model closely matched by Erie only; and inspectionally apparent lower value data 'tails' suggesting inflection regions and slope changes, herein designated as accelerated eutrophication thresholds (AET). Additionally, AETs presumed on inspection of fishery records

agree well as to concentration level and originally suggested AETs. Lumped and averaged fishery chemoconcentration AET estimates and separate subregressions yield a lumped '95% confident interval' mean AET estimate of 157 plus or minus 41 people in a given drainage basin/square km at-mean-depth of that lake basin. This coherent and reasonable image may prove highly significant and contribute strongly toward real ecological engineering. (Jones-Wisconsin)
W75-09027

CHANGES IN ZOOPLANKTON POPULATIONS IN LAKE ONTARIO (1939-1972),
State Univ. of New York, Albany. Dept. of Biological Sciences.
D. C. McNaught, and M. Buzzard.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 76-86, 1973. 1 fig, 5 tab, 11 ref.

Descriptors: *Zooplankton, *Community development, *Lake Ontario, Dominant organisms, Aquatic populations, Niches, Crustaceans, Daphnia, Standing crops.
Identifiers: Cyclopoids, Calanoids, Species diversity.

Suitable available data on zooplankton populations of Lake Ontario were examined to determine whether significant changes in community structure have occurred since 1939. Niche theory is utilized to predict the theoretical carrying capacity of the Lake Ontario ecosystem. Since 1968 the crustacean limnoplankton of the lake has been dominated in July by Cyclops bicuspidatus and Bosmina longirostris. Apparently in 1939 Daphnia spp. and Diaptomus spp. were relatively more abundant at the same time. Generally summer standing crops of zooplankton in the inshore waters (less than 50 m) do not show a significant increase from 1939 to 1972. At the same time, the composition of these communities has shifted from dominance by the cyclopoids and calanoids (81%) to the cladocerans (48-84%). Concomitantly, numerous new species have been recorded, the most recent being Diaptomus ashlandi in 1972. Two additional trends are evident since 1968. The species diversity has increased in the inshore waters from 1.77 to 2.98, due to increases in the evenness component. At the same time, their theoretical carrying capacity for zooplankton has also increased. (Jones-Wisconsin)
W75-09028

THE INFLUENCE OF WATER RENEWAL ON THE NUTRIENT SUPPLY IN SMALL, OLIGOTROPHIC (NEWFOUNDLAND) AND HIGHLY EUTROPHIC (ALBERTA) LAKES,
Canadian Wildlife Service, Halifax (Nova Scotia).
J. J. Kerekes.
In: Proceedings, Symposium on the Lakes of Western Canada, 1972, Water Resources Center, University of Alberta, Edmonton, p 383-398, 1973. 1 fig, 3 tab, 48 ref.

Descriptors: *Nutrients, Lake stages, *Canada, Watersheds(Basins), Phosphorus, Evapotranspiration, Evaporation, Precipitation(Atmospheric), Ions, Primary productivity, Salinity, *Eutrophication.
Identifiers: *Water renewal, Newfoundland, Alberta, *Oligotrophic lakes.

It is proposed that the water renewal, the evaporation coefficient, or both, be used as the basis for an index to represent successional stages of lake-drainage basin systems in a given geographic area. Based on two studies, certain modifications are proposed to the hypothesis that the average rate at which nutrients enter a lake and the variables dependent on these nutrients, such as total phosphorus concentrations, phytoplankton biomass and production, should be proportional to the total catchment area and inversely proportional to lake volume. Study of five small oligotrophic lakes lying in an area with a high water surplus in Newfoundland indicates that both primary production at optimum light and total phosphorus concentration per unit volume representative of the whole lake, bear a relationship to water renewal coefficient that is curvilinear, with primary production and total phosphorus beginning to decline when water renewal exceeds an optimum rate. In five highly eutrophic lakes with minimal or no water surplus near Edmonton, Alberta, basins with higher evaporation coefficients have higher nutrient supply and higher salinities. The relationship between primary production and evaporation coefficient is curvilinear. Once an optimal salinity level is reached, further increase in salinity will inhibit primary production. (Jones-Wisconsin)
W75-09029

EUTROPHICATION AND ITS ALLEVIATION IN THE UPPER QU'APPELLE RIVER SYSTEM, SASKATCHEWAN,
Saskatchewan Univ. (Saskatoon). Dept. of Biology.
U. T. Hammer.
In: Proceedings, Symposium on the Lakes of Western Canada, 1972, Water Resources Center, University of Alberta, Edmonton, p 352-368, 1973. 6 fig, 4 tab, 23 ref.

Descriptors: *Water quality control, *Eutrophication, *Multiple-purpose reservoirs, *Canada, *Cyanophyta, Nutrients, Sewage effluents, Agriculture, Runoff, River basins, Oxygen sag, Fish, Dissolved solids, Ions, Phosphates, Nitrogen, Standing crops, Stratification, Light penetration, Primary productivity.
Identifiers: Qu'Appelle River System(Saskatchewan), Buffalo Pound Lake(Saskatchewan), Echo Lake(Saskatchewan), Katepwa Lake(Saskatchewan), Last Mountain Lake(Saskatchewan), Pasqua Lake(Saskatchewan), Nutrient budget, Dilution.

Blue-green algae blooms have been prominent in the lakes of the Upper Qu'Appelle River system during the last two decades. These blooms are associated with high nutrient levels in the lakes as well as high nutrient loadings derived from domestic sewage and from agricultural runoff. The lakes are important for recreation, commercial fishing, agricultural uses, a source of water for Moose Jaw and Regina, and as cesspools for sewage effluent from these two cities. They are sites of significant waterfowl habitats and are important in flood control. Buffalo Pound Lake, uppermost in the system and a water supply source, has received, since 1967, an intermittent supply of water from Lake Diefenbaker, a large oligotrophic reservoir on the South Saskatchewan River which has resulted in a decrease in total dissolved solids and major ions to less than half former levels; the orthophosphate was reduced to one-tenth of former levels; total inorganic nitrogen was also reduced to some extent. Algal blooms were absent in 1971 and 1972 in this lake, whereas the lakes further downstream contained very heavy blooms. Legislative action, public cooperation, and stringent guidelines to control nutrient influx are suggested as approaches to mitigate eutrophication in these lakes. (Jones-Wisconsin)
W75-09030

EUTROPHIC LAKES IN THE MACKENZIE DELTA: THEIR USE BY WATERFOWL,
Alberta Univ., Edmonton. Dept. of Geography.
D. Gill.
In: Proceedings, Symposium on the Lakes of Western Canada, 1972, Water Resources Center, University of Alberta, Edmonton, p 196-201, 1973.

Descriptors: *Eutrophication, *Lakes, *Waterfowl, *Canada, Deltas, Sediment transport, Aquatic plants, Habitats, Geomorphology, Water levels.
Identifiers: *Mackenzie Delta(Canada), Thermokarst lakes, Delta lakes.

The geomorphology and plant succession of lakes in the Mackenzie River Delta and their use by waterfowl are described and the interaction that occurs between vegetation and waterfowl in this type of ecologic niche is traced. Because of their position within an alluvial environment, most delta lakes are eutrophic and harbor much aquatic vegetation. Delta lakes are not equally eutrophic, particularly within deltas underlain by permafrost. In the Mackenzie River Delta, one-third of the lakes are bounded by high levees and receive an input of nutrients through sediment transport only during high floods, thus reducing aquatic vegetation. Most of these lakes are subject to bank recession through thermokarst action, thus littoral plant succession is absent; such lakes are not frequented by waterfowl. Another third of the lakes are highly eutrophic, maintained in this condition through transport of nutrient-rich sediment by small channels during flood stages, and during channel flow reversals. Within this type of lake miniature deltas are formed near lake-channel junction, and shoals are constructed from incoming sediment by wave action. These isolated geomorphic features provide relatively predator-free resting habitat for waterfowl. The successional vegetation that establishes on them provides high-quality waterfowl grazing. (Jones-Wisconsin)
W75-09031

CHANGES IN WATER CHEMISTRY ACCOMPANYING SUMMER FISH KILLS IN SHALLOW EUTROPHIC LAKES OF SOUTHWEST MANITOBA,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
J. Barica.
In: Proceedings, Symposium on the Lakes of Western Canada, 1972, Water Resources Center, University of Alberta, Edmonton, p 228-241, 1973. 4 fig, 2 tab, 13 ref.

Descriptors: *Water chemistry, *Summer, *Fishkill, *Shallow water, *Eutrophication, Salinity, *Canada, Cyanophyta, Oxygen sag, Ammonia, Phosphates, Nitrogen, Carbon, Phosphorus, Chlorophyll, Carbon dioxide, Fish farming, Rainbow trout.
Identifiers: *Manitoba, Aphanizomenon flos-aquae.

Fish mortalities resulting from excessive growth of Cyanophyta and their degradation products represent the most advanced stage of lake eutrophication. Four cases of summer fish kills following the collapse of heavy blooms of Aphanizomenon flos-aquae in shallow eutrophic lakes located in the Erickson area of Southwestern Manitoba are described. The sequence of events was similar in each case. Partial die-off of algae preceded the fish kills. Rapid degradation of algal cells and their metabolites played a crucial role in the subsequent chemical changes. Dissolved oxygen dropped from supersaturation levels to below those required by fish. Ammonia and orthophosphate concentrations increased rapidly, while changes in dissolved organic nitrogen, carbon and phosphorus were slight. On the average, particulate CNP fell on one-third and chlorophyll-a to one fifth of their concentrations proceding the blooms. Total inorganic carbon dioxide concentrations reached their maxima before the fish kills. The recovery of normal chemical conditions and the algal succession following the collapse of the Aphanizomenon bloom varied from lake to lake. An evaluation of the fish kill mechanism from the viewpoint of water chemistry as a part of broader studies of aquaculture in Canadian winterkill lakes currently in progress is presented. (Jones-Wisconsin)
W75-09032

EUTROPHICATION AND RECREATIONAL FISHES IN TWO LARGE LAKE BASINS IN BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.

T. G. Northcote.
In: Proceedings, Symposium on the Lakes of Western Canada, 1972, Water Resources Center, University of Alberta, Edmonton, p 175-188, 1973. 3 fig, 2 tab, 14 ref.

Descriptors: *Eutrophication, *Sport fish, *Productivity, Water pollution effects, *Canada, Growth rates, Phosphates, Agricultural runoff, Zooplankton, Salmonids, Sewage effluents, Spawning, Habitats, Nitrogen.
Identifiers: *British Columbia, Kootenay Lake(British Columbia), Okanagan Lake(British Columbia), Skaha Lake(British Columbia), Wood Lake (British Columbia).

Two large lake basins in British Columbia--the Kootenay and the Okangan--are compared relative to the causes and sequence of eutrophication and its impact on recreational fishes. In Kootenay Lake high phosphate loading was due largely from operation of a fertilizer plant nearly 400 km upstream on the Kootenay River. Increased algal production, zooplankton abundance and growth of some salmonoids are probably attributable to this source, but not the sharply increased catch of sport fish. The largest lake in the Okanagan drainage basin, Okanagan Lake, receives a major portion of its phosphate load from two domestic sewage plants but, except for localized areas, does not exhibit serious effects of eutrophication. Intermediate-sized Skaha Lake receives high nutrient loads from a domestic sewage treatment plant and has shown characteristic eutrophication effects including algal blooms and enhanced salmonoid growth. On the other hand, Wood, one of the smaller lakes in the system, has shown more intense eutrophication effects for several decades and recent deterioration of recreational fishing. In balance, effects of eutrophication in both major systems probably have not had such deleterious effects on recreational fishes as have losses of spawning stream habitats through various other man-induced disturbances. (Jones-Wisconsin)
W75-09033

ENGINEERING ASPECTS OF POLLUTED LKE RECLAMATION,
Notre Dame Univ., Indiana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-09034

RELATIONS BETWEEN MICROBIAL HETEROTROPHIC ACTIVITY, ORGANICS, AND DEOXYRIBONUCLEIC ACID IN OLIGOTHROPHIC LAKE SEDIMENTS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
L. S. Cresceri, and M. Daze.
FWI Report 74-14, (1974). (EDFB-IBP No 173) 17 p, 8 fig, 7 ref. AEC AG 199, 40-193-69.

Descriptors: *Bacteria, *Microbial degradation, *Lake sediments, *Biomass, Organic matter, Hydrogen ion concentration, *New York, Fluctuations, Lakes, Water temperature, Rates, Algae.
Identifiers: *Deoxyribonucleic Acid, *Lake George(NY).

Microbial decomposition dynamics in sediments of bays in Lake George, New York were studied by relating rate measurements to microbial biomass. In a developed bay in a mesotrophic basin, organic content varied widely. Deoxyribonucleic acid (measure of living cellular material) and microbial activity followed each other closely in a diphasic plot, due to variable allochthonous inputs and wave action which decreased with depth. The macroalga, Nitella flexilis, showed spring and summer growth surges. Soluble organics and plant material probably contributed to the diphasic activity. At all depths, there was decreased microbial activity at the beginning and end of the growing season, probably due to temperature in the spring and nutrition in the fall. Over the winter there was probably an accumulation of microbial biomass which showed less activity per milligram DNA at low temperatures. In Warner Bay microbial activity could be expressed as a function of the sediment DNA content and percent organic content. In the minimally developed oliogtrophic Hearts Bay, activity was expressed as a function of DNA content, percent organic content, and temperature. DNA measurements have applicability as a biomass indicator in lake sediments, since rapid biodegradability in natural systems and correlation with microbial activity measurements have been shown. (Buchanan-Davidson--Wisconsin)
W75-09035

EFFECTS OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON LAKE WABAMUN, ALBERTA, CANADA: THE EPIPELIC AND EPIPSAMMIC ALGAL COMMUNITIES,
Alberta Univ., Edmonton. Dept. of Botany.
M. Hickman.
Hydrobiologia, Vol 45, No 2-3, p 199-215, 1974. 6 fig, 4 tab, 17 ref.

Descriptors: *Biological communities, *Algae, *Thermal pollution, Powerplants, Varieties, Standing crops, Light penetration, Diatoms, Lake sediments, Water temperature, Littoral, Waves(Water), *Canada, Ice cover, Deep water.
Identifiers: *Lake Wabamun(Alberta).

Epipelic algal standing crops were increased by the discharge of thermal effluent into Lake Wabamun, particularly in the discharge canal. The increase in the standing crop size of the epipelon was due to Oscillatoria amoena and O. borneti in the heated area, while the discharge canal provided the inoculum of algae for the heated area of the lake. In the discharge canal the increase of algal standing crops was also due to increased light penetration to the sediment, because the heated effluent kept that area of the lake free of ice. The species composition of the diatoms was similar at all stations except in the discharge canal where there was a reduction in the number of diatom species. Navicula cuspidata developed best in the canal in the summer. Amphora ovalis var. pediculus was the dominant diatom during the winter under ice cover. The heated effluent had no effect on the standing crop or species composition of the epipsammon. Study of sediment cores showed that the shallow littoral zone of the lake was very disturbed by wind-induced wave action thus affecting the epipelic algal communities. (Buchanan-Davidson--Wisconsin)
W75-09036

SOLUBILITY EQUILIBRIUM CONSTANT OF ALPHA-HOPEITE,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Nriagu.
Geochimica et Cosmochimica Acta, Vol 37, No 11, p 2357-2561, 1973. 1 tab, 18 ref.

Descriptors: *Solubility, *Zinc, *Phosphates, Model studies, Lake sediments, Ions.
Identifiers: *Alpha-hopeite, Zinc phosphates.

Precipitation of zinc phosphates may play an important role in regulating the levels of Zn and P in natural water systems. The 25C saturation curve of alpha-hopeite in dilute phosphoric acid solutions and the solubility equilibrium constant derived therefrom are presented. The composition of the supernatant solutions saturated with respect to alpha-hopeite is tabulated along with the solubility product constants derived from each set of data. The saturation curve for synthetic alpha-hopeite in dilute phosphoric acid solutions has been determined at 25C as a function of pH. Interpretation of the data in terms of a model which assumes the formation of the ion-pairs zinc hypophosphate and ZnH2PO4 ions in these solutions resulted in a solubility product constant for alpha-hopeite. The data show that the formation of hopeite may influence both the availability of zinc in soils and the zinc levels in natural water systems. Several workers have concluded that tertiary zinc phosphates are too soluble to be of importance in regulating the availability of Zn and P in soils and sediments. Such a conclusion may need a revision in view of the present data. (Jones-Wisconsin)
W75-09037

THERMODYNAMICS OF SYSTEM H20-NA2HPO4-(NH4)2HPO4 AT 25(DEGREES)C,
Canada Centre for Inland Waters, Burlington (Ontario).
R. F. Platford.
Journal of Chemical and Engineering Data, Vol 19, No 2, p 166-168, 1974. 1 fig, 3 tab, 8 ref.

Descriptors: *Thermodynamics, *Solubility, Salts, Phosphates, Ammonium salts, Sodium compounds.
Identifiers: *Stercorite, Phosphate salts, Guano.

Stercorite is a water-soluble mineral found in guano deposits on islands off the coasts of Southwest Africa and Peru. As a component in fertilizers, it and its two constituent salts, sodium hypophosphate and ammonium hypophysphate were studied. Water solubility of each salt has been reported, but the only other thermodynamic data are the osmotic and activity coefficients for the sodium salt. The present study deals with the solubility and free energy data for the system at 25C. The solubilities for the ternary system were determined by conventional measurements on aliquots of saturated solutions. The ammonium salt was determined gravimetrically as ammonium tetraphenylboron and the total salt content was determined by evaporation in vacuum over sulfuric acid to constant weight. The sodium salt was then estimated by difference. The system contains two congruent points of mutual saturation with two salts (eutonics). The composition of these eutonics and of the solid phases in equilibrium with them were checked by an isopiestic method. The phase diagram for the system is constructed; the double salt is congruently soluble at 25C. The excess free engeries of mixing of the constituent salts are small and negative. (Jones-Wisconsin)
W75-09038

SPATIAL AND TEMPORAL DISTRIBUTION OF CHLORPHYLL, AND PHEOPIGMENTS IN SURFACE WATERS OF LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
W. A. Glooschenko, J. E. Moore, and R. A. Vollenweider.
Journal Fisheries Research Board of Canada, Vol 31, No 3, p 265-274, 1974. 5 fig, 1 tab, 30 ref.

Descriptors: *Distribution, *Chlorophyll, *Pigments, *Lake Erie, Surface waters, Zooplankton, Phytoplankton, Organic matter, Food chains, Detritus, Spatial distribution, Temporal distribution.
Identifiers: *Pheopigments.

A definite bimodal pattern of phytoplankton was found in the Central and Eastern basins. Chlorophyll-a analyses including pheopigments were made on water samples taken from Lake Erie between April and December 1970. Lake Erie waters showed the highest mean chlorophyll-a level (11 micrograms/1) in the mid-Western Basin, 6 micrograms/1 off Erie, Pennsylvania, high values to the east of Cleveland, Ohio, and the lowest yearly mean values in the eastern portion of the Central Basin and in the Eastern Basin (approximately 3 micrograms/l). Ratios of chlorophyll-a between the Eastern, Central, and Western basins had a yearly mean of 1:1.4:2.8, respectively; maximum differences occurred in the summer when the ratio was 1:1.5:7.2. Pheopig-

ment concentration in surface waters reached a maximum in late October, corresponding to the time of the fall overturn of the lake and subsequent resuspension of organic matter containing degradation products from the bottom of the lake. No significant correlation was found between zooplankton abundance and pheopigment concentration indicating that zooplankton food chains are primarily detrital in Lake Erie, and grazing of living phytoplankton playing a lesser role compared to more oligotrophic water bodies. (Buchanan-Davidson--Wisconsin)
W75-09039

THE EFFECT OF CITRATE ON PHYTOPLANKTON IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
W. A. Glooschenko, and J. E. Moore.
In: Bioassay Techniques and Environmental Chemistry, Ann Arbor Science Publishers, Inc., 1973, p 321-334. 6 fig, 3 tab, 33 ref.

Descriptors: *Chelation, *Growth rates, *Sodium compounds, *Phytoplankton, Lake Ontario, Detergents, Formulation, Trace elements, Plant growth, Copper, Zinc, Nitrilotriacetic acid.
Identifiers: *Citrate, NTA.

To investigate effects of citrate upon phytoplanktonic algae, field bioassay studies were performed in Lake Ontario and Hamilton Harbor, an embayment subjected to high industrial effluents primarily from steel mills. The experiments performed showed that citrate caused a different response by algae in the water bodies: Lake Ontario, slightly eutrophic, low trace metal content water, and Hamilton Harbor, a highly eutrophic, high trace element content water. Generally, citrate additions to Lake Ontario caused decreases in algal growth compared with controls. This study also involved copper toxicity to algae and found that while 50 ppb copper inhibited photosynthesis, 500 ppb of NTA reversed this copper toxicity to varying degrees. Sodium citrate, a weak chelator, either increased toxicity or did not reduce trace metal toxicity as much as EDTA in short term C-14 uptake experiments. Chelators such as sodium citrate can exhibit variable effects on algal growth, with trace metal concentration of the culture medium (or natural water in which the algae are present) being a most important variable. Large-scale additions of sodium citrate to natural aquatic systems could either increase or decrease algal growth depending on the concentration and the chemical composition of the natural water. (Jones-Wisconsin)
W75-09040

ORGANIC PRODUCTION STUDIES IN HIGH ALTITUDE LAKES OF INDIA: II. ZOOPLANKTON, PHYTOPLANKTON AND PEDON OF HIGH ALTITUDE KASHMIR LAKES, KOUNSARNAG AND ALPATHER, WITH CORRELATION OF PLANKTONVOLUME, PH AND TEMPERATURE OF DAL LAKE,
Kashmir Univ., Srinagar (India). Dept. of Zoology.
S. M. Das, S. Choudary, N. Ahmad, S. Akhtar, and S. Peer.
Kashmir Sci, Vol 7, No 1/2, P 119-132, 1970. Illus.

Descriptors: Lakes, *Zooplankton, *Phytoplankton, *Organic matter, *Production, Temperature, Volume.
Identifiers: Alpather, Altitude, *India(Dal Lake), Kashmir, Kounsarnag, *Pedon.

Zooplankton, phytoplankton and pedon are reported for the lakes Kounsarnag (13,500 ft), Alpather (13,000 ft) and Dal (5150 ft). Quantitative correlations between total plankton production and the temperature and pH for a period of 17 mo. were discussed. Both of the higher altitude lakes are oligotrophic and are ice bound for 6-8 mo. of the year. During this time they are quite poor in plankton. For Dal Lake, the total plankton volume is low during Jan., Feb. and March. There is a sudden rise from middle of April to a maximum volume in June which is directly proportional to the water temperature during the period. However, the pH shows only a slight rise from April to June. The plankton volume drops off sharply during July and Aug.; while the water temperature is still rising to a peak in Aug. Therefore, temperature and light could not be limiting factors for plankton production, which is usually the case in temperate lakes. The only possible factors for this reduction in plankton appear to be: intensive grazing by fish larvae and frogs which are abundant in the lake after June, and a sharp falloff in phosphate and silicate values. A list of the various species composing plankton and pedon of these lakes is given. The significance of this study to organic production and high altitude fisheries is stressed.--Copyright 1973, Biological Abstracts, Inc.
W75-09041

ABUNDANCE AND PRODUCTION OF BACTERIA IN LATVIAN LAKES,
V. I. Romanenko.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1306-1310, 1973. 5 ref.

Descriptors: *Productivity, *Bacteria, *Lakes, Decomposing organic matter, Trophic level, Oxygen, Phytoplankton, Reproduction, Oxidation-reduction potential, Hydrogen ion concentration.
Identifiers: *Latvia.

Of eight Latvian lakes studied, two were oligotrophic, two mesotrophic with macrophyte growths in the littoral zone, two eutrophic, and two dystrophic. The oligotrophic lakes have a depth of 65 m and water transparency of 3.9 m. The other lakes are shallower, with a transparency in the eutrophic lakes of 0.3 m. The lakes were examined for oxygen (by Winkler's method), bicarbonates (by direct titration), the production of phytoplankton (by radiocarbon technique), decomposition of organic matter (from oxygen consumption in dark bottles), the abundance of bacteria (by direct counts in membrane filters), heterotrophic assimilation of carbon dioxide by microorganisms (by C-14 technique). The reproduction rate and production of bacteria were calculated from the heterotrophic assimilation of carbon dioxide. The bacterial groups were identified in elective incubation media. The oxidation-reduction potential was determined with a platinum electrode in the mud sampled with a plexiglass tube. The lakes poor in organic matter produce 16-37 micrograms of C/l per day in the bacterial biomass, the rich lakes give 490-1190 micrograms of C. The generation time of bacteria varies from 6 to 40 hours. (Jones-Wisconsin)
W75-09042

THE CONTRIBUTION OF INDIVIDUAL SPECIES OF ALGAE TO PRIMARY PRODUCTIVITY OF CASTLE LAKE, CALIFORNIA,
E. A. Stull, E. de Amezaga, and C. R. Goldman.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1776-1783, 1973. 4 fig, 1 tab, 11 ref. NSF GB 6422X.

Descriptors: *Algae, *Primary productivity, California, Biological communities, Photosynthesis, Carbon fixation, Biomass, Radioactivity techniques.
Identifiers: *Individual algal species, Castle Lake(Calif), Autoradiography.

Quantitative autoradiography was used to measure the contribution of individual algal species to primary productivity of Castle Lake, California, and demonstrated the types of information available with the use of this technique. Samples for autoradiographic analysis of primary productivity were an integral part of the extensive sampling program. At 0 m the most abundant organism was the diatom Cyclotella meneghiana with 353 cells per milliliter. At 1 m Cyclotella meneghiniana and Microcystis aeruginosa had the largest biomass and were large contributors to community primary productivity. The most interesting aspect of the comparison between biomass and primary productivity is the observation that some minor species contribute more heavily to primary productivity than to algal biomass. Autoradiography measurements of the primary productivity of individual species yields much information that can be used to interpret the nature of phytoplankton communities. Studies of the relationship between abundance and productivity of algal species will provide more information on the structure of phytoplankton communities and a reanalysis of the meaning of diversity and seasonal sucession. (Jones-Wisconsin)
W75-09043

DYNAMICS AND PRODUCTION OF SIMOCEPHALUS SERRULATUS (KOCH) IN TWO LARGE NATURAL AND MAN-MADE PONDS IN EASTERN CANADA,
K-J. Ang, and C. H. Fernando.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1448-1456, 1973. 8 fig, 1 tab, 8 ref.

Descriptors: *Dynamics, *Productivity, *Zooplankton, *Littoral, Canada, Reproduction, Mortality, Predation.
Identifiers: *Simocephalus serrulatus, Waterloo(Ontario), Columbia Lake Reservoir(Ontario), Miller's Lake(Ontario).

Field and laboratory studies were combined in investigating the dynamics and production of littoral zooplankton populations. Simocephalus serrulatus, the dominant littoral species in large ponds near Waterloo, Ontario, was chosen. Both these ponds have a high proportion of their total area covered by rooted vegetation during the summer accounting for about 30% in Columbia Lake reservoir and about 50% in Miller's Lake. Experiments were conducted to determine the rate of egg development, population growth in the absence of predation, physiological death, number of instars, and duration of juvenile and adult. The best turnover rate of S. serrulatus and the high rate of predation indicate that practically all the biomass produced by this species is passed on rapidly to the next trophic level. The logistic growth curve of the population is typical of many zooplankters. This pattern of growth may be interpreted as a reflection of a food limited system in which food becomes abundant as the result of increased nutrients in spring. Population size in summer is probably regulated more by predator pressure than by food scarcity. (Jones-Wisconsin)
W75-09044

SUMMER PHYTOPLANKTON BLOOMS IN AUKE BAY, ALASKA, DRIVEN BY WIND MIXING OF THE WATER COLUMN,
Oregon State Univ., Corvallis. School of Oceanography.
R. L. Iverson, H. C. Curl, H. B. O'Connors, D. Kirk, and K. Zakar.
Limnology and Oceanography, Vol 19, No 2, p 271-278, 1974. 8 fig, 24 ref.

Descriptors: *Bays, *Phytoplankton, *Eutrophication, *Winds, *Mixing, Alaska, Nitrates, Summer, Nitrogen, Chlorophyll, Density.
Identifiers: *Auke Bay(Alaska).

A mechanism for producing major summer phytoplankton blooms in Auke Bay, Alaska based on wind mixing of nitrate-rich water from deeper layers into the photic zone, is proposed. Temperature, salinity, and chlorophyll-a were measured. Nitrate was determined in samples, frozen and analyzed. Surveys to determine the spatial variability of chlorophyll-a and water density in Auke Bay showed that the density structure was uniform over the bay. Density was largely a func-

tion of salinity with temperature effects secondary. Both temperature and salinity were stratified most of the summer. Tidal-induced turbulence was not sufficient to destroy the near surface density structure. At 27 m, nitrate showed a general decrease over summer, accelerating during the first few days of June after a period of strong wind mixing. Winds blowing from the southeast along the only significant entrance into Auke Bay mixed nitrate into the photic zone from deeper in the water column, resulting in major summer phytoplankton blooms. The wind-mixing effect could be monitored by measuring salinity changes caused by mixing of freshwater from the glacially originating Mendenhall River down into the water column. (Jones-Wisconsin)
W75-09045

A DIURNAL ZOOPLANKTON MIGRATION STUDY IN LAKE MEAD,
Arizona Univ., Tucson.
R. D. Staker.
Journal of Arizona Academy of Science, Vol 9, No 3, p 85-88, October 1974. 6 fig, 1 tab, 25 ref. OWRT A-036-ARIZ(4).

Descriptors: *Zooplankton, *Migration patterns, *Migration, *Diurnal, *Water temperature, Depth, Sampling, Thermal stratification, Lakes, Freshwater, Thermal properties, *Arizona, Water pollution effects.
Identifiers: *Lake Mead(Ariz).

The purpose was to find out whether nocturnal migration patterns occur in the zooplanktonic fauna of Lake Mead under isothermal conditions and to determine the extent of this migration. The principal organisms sampled and analyzed were calanoid, cyclopoid, nauplii, Bosmina longirostris, Keratella cochlearis, and Polyartha sp. An analysis of variance on the data comparing the variation in the mean depth during the daylight hours to the night hours was performed to test whether variations were due to change alone. The results obtained show that the rotifers Keratella cochlearis and Polyartha sp. and the Bosmina longisostris do migrate. The analysis also indicates that variations seen in Calanoida, Cyclopoida, and nauplii are due to change variation. The depth of the three migrating organisms changed less than 5 m between day and night. Since the study was performed under the isothermal conditions of winter, it is believed that migration is not a function of temperature. (Mastic-Arizona)
W75-09059

THE EFFECTS OF DIURON ON BACTERIAL POPULATIONS IN AQUATIC ENVIRONMENTS,
Clemson Univ., S.C. Dept. of Microbiology; and Clemson Univ., S.C. Dept. of Zoology.
R. K. Guthrie, D. S. Cherry, and R. N. Ferebee.
Water Resources Bulletin, Vol 10, No 2, p 304-310, April 1974. 1 fig, 2 tab, 7 ref. OWRT A-022-SC(9).

Descriptors: *Bacteria, *Herbicides, *Aquatic environment, *Reservoirs, Lakes, Laboratories, Runoff, Waste water(Pollution), Water treatment, Drainage water, Food chains, Water quality, Water pollution effects.
Identifiers: *Diuron, Chromagenic bacteria, Natural aquatic bacteria, Impounded ecosystems.

The naturally occurring, aerobic, heterotrophic bacterial populations of two impounded ecosystems were studied in a laboratory tank system. One reservoir received runoff from a rural drainage basin only, while the second received treated municipal sewage, industrial waste and heavy recreational use. Water from each reservoir was treated with 1.4 ppm final concentration of diuron and studied for total bacterial counts and nutritional source types. Control tanks were studied concurrently. Total counts increased shortly after diuron addition; however, this was followed by a decrease to a level below the control. Reduction in diversity was significantly greater in water from the polluted reservoir, but chromagenic bacteria were significantly reduced in the non-polluted reservoir. Starch utilizers were most affected by herbicide addition. Bacteria growing on protein or glucose salts were essentially unaffected. (Bell-Cornell)
W75-09079

PHYTOPLANKTON DISTRIBUTION AND WATER QUALITY INDICES FOR LAKE MEAD (COLORADO RIVER),
Arizona Univ., Tucson. Dept. of Biological Sciences.
R. D. Staker, R. W. Hoshaw, and L. G. Everett.
Journal of Phycology, Vol 10, No 3, p 323-331, 1974. 2 fig, 4 tab, 39 ref. OWRT A-036-ARIZ(5). NSF 25130.

Descriptors: *Reservoirs, *Eutrophication, *Bioindicators, *Phytoplankton, Diatoms, Chlorophyta, Pyrrophyta, Cyanophyta, Euglenophyta, Dinoflagellates, Varieties, *Colorado River, Water pollution effects, Pollutant identification, *Arizona.
Identifiers: *Lake Mead(Ariz), Bacillariophyta, Chrysophyta, Cryptophyta.

Phytoplankton samples were collected at varying stations, times, and depths from September 1970 to June 1971 at Lake Mead, Arizona, then processed through a millipore filter apparatus and 79 planktonic algae identified. Species of Bacillariophyta were most numerous (42), followed by Chlorophyta (18), Cyanophyta (9), Chrysophyta (3), Cryptophyta (3), Pyrrophyta (2), and Euglenophyta (2). Bacillariophyta were present at all times and stations, with maximum occurrence during winter and late summer. Chlorophyta were present at all stations and depths throughout the year with the highest percentage composition in April. Of 18 green algae, 10 were chlorococcalean species. Cyanophyta were the major phytoplanktons in September and November. Cryptophyta were high in February-April. Ceratium hirundinella was the most important dinoflagellate. Thirty-three of the 60 most pollution-tolerant algae genera according to Palmer's pollution-tolerant algae index and at least one species of each of five of Palmer's and Nygaard's indices calculated from the phytoplankton data indicated eutrophic conditions in Lake Mead, especially Boulder Basin. (Buchanan-Davidson-Wisconsin)
W75-09083

ECOLOGICAL STUDIES OF TWO SWAMP WATERSHEDS IN NORTHEASTERN NORTH CAROLINA - A PRECHANNELIZATION STUDY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
G. B. Pardue, M. T. Huish, and H. R. Perry, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 126, $11.50 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rept No 105, April 1975. 455 p, 29 fig, 51 tab, 120 ref, 4 append. OWRT B-049-NC(1). 14-31-0001-3626.

Descriptors: Fish, Wildlife, Channel improvement, *Wildlife habitats, *Baseline studies, *Fish populations, Stream improvement, *Swamps, Wetlands, Drainage effects, *Watersheds(Basins), *North Carolina, Ecology, *Ecosystems.
Identifiers: *Preconstruction, *Stream channelization, Swamp ecosystem, Wildlife population, Prechannelization.

Indices to the abundances of fish and wildlife of two eastern North Carolina wooded swamp stream environments were developed during 1972, 1973, and 1974, as a preconstruction study of the effects of stream channelization on fish and wildlife. In addition, the relationships of physical, chemical and vegetative parameters to the faunal components of the study sites were evaluated. Indices were obtained for some fish, bird and mammal populations (mourning dove, quail, ducks, woodcock, songbirds, breeding songbirds, gray squirrel, raccoon, opossum, small mammals and deer). Hunter use studies were also conducted. Statistical tests were utilized when applicable to test year and area differences. The results are considered to be essential as baseline information to future studies of stream alteration and also provide useful information regarding faunal and floral diversity as well as seasonal relationships within the swamp ecosystem. (Stewart-North Carolina State)
W75-09130

EFFECTS OF REDUCED OXYGEN CONCENTRATIONS ON THE EARLY LIFE STAGES OF MOUNTAIN WHITEFISH, SMALLMOUTH BASS AND WHITE BASS,
National Water Quality Lab., Duluth, Minn.
R. E. Siefert, A. R. Carlson, and L. J. Herman.
The Progressive Fish-Culturist, Vol 36, No 4, p 186-190, October 1974. 3 tab, 10 ref.

Descriptors: *White bass, *Dissolved oxygen, *Bioassay, *Immature growth stage, *Laboratory tests, Temperature, Juvenile fish, Viability, Larval growth stage, Freshwater fish, Bass, Oxygen, Water pollution effects.
Identifiers: *Micropterus dolomieui, *Mountain whitefish.

As a part of a study to determine the dissolved oxygen requirements of some freshwater fish species, mountain whitefish (Prosopium williamsoni, smallmouth bass (Micropterus dolomieui), and white bass (Morone chyrsops) at various early growth stages were raised in conditions of reduced dissolved oxygen. A reduction of oxygen concentration of 50% saturation at 4C and 7C did not affect the survival of young mountain whitefish but developmental delays did occur. A reduction to 35 percent saturation of dissolved oxygen appears to harm the survival of mountain whitefish. Smallmouth bass embryos require a dissolved oxygen concentration of greater than 50% at optimal temperature for proper survival. There was poor survival of young white bass at 20 percent saturation. Larvae reared at 35 percent saturation appeared normal except for an apparent inhibition of yolk-sac absorption. (Katz)
W75-09132

FISH KILL DUE TO 'COLD SHOCK' IN LAKE WABAMUN, ALBERTA,
Alberta Univ., Edmonton. Dept. of Zoology.
G. H. Ash, N. R. Chymko, and D. N. Gallup.
Journal of the Fisheries Research Board of Canada, Vol 31, No 11, p 1822-1824, November 1974. 2 fig, 6 ref.

Descriptors: *Fishkill, *Heated water, Temperature, *Shiners, Mortality, Thermal water, Discharge(Water), Thermal powerplants, Clams, Powerplants, *Canada, *Pikes, Thermal stress, Lakes, Thermal pollution, Water pollution effects.
Identifiers: *Cold shock, *Lake Wabamun(Alberta).

A thermal fish kill due to 'cold shock' caused by a mechanical failure in the steam electric generating unit was observed in Lake Wabamun, Alberta, on February 8, 1973 in the region of the discharge canal. The most rapid temperature decline occurred in the initial 30 minutes after shutdown when the temperature dropped 16.9C (21.8 to 4.9C). The major fish species affected included spottail shiners (Notropis hudsonius and Northern pike (Esox lucius). The freshwater clam Anodonta sp. did not appear to be affected. (Katz)
W75-09133

RETARED BEHAVIORAL DEVELOPMENT AND IMPAIRED BALANCE IN ATLANTIC SAL-

MON (SALMO SALAR) ALEVINS HATCHED FROM GASTRULAE EXPOSED TO DDT,
Saint Fancis Xavier Univ., Antigonish (Nova Scotia). Dept. of Biology.
P. A. Dill, and R. C. Saunders.
Journal of the Fisheries Research Board of Canada, Vol 31, No 12, p 1936-1938, December 1974. 1 fig, 10 ref.

Descriptors: *Fish behavior, *DDT, *Fry, *Atlantic salmon, *Water pollution effects, Behavior, Immature growth stage, Bioassay, Laboratory tests, Environmental effects, Pesticides, Toxicants.
Identifiers: *Sublethal effects.

Eggs of Atlantic salmon (Salmo salar) were subjected to 0.1, 0.05, 0.01 or 0.005 ppm DDT at gastrulation. Behavior of hatched fish was observed in DDT-free aquaria for about 30 days, and compared with that of controls. Exposure to the two higher concentrations of DDT retarded behavioral development and impaired balance. The consequences of such behavior changes to wild fish are discussed. (Katz)
W75-09134

IDENTIFICATION, ANALYSIS AND REMOVAL OF GEOSMIN FROM MUDDY-FLAVORED TROUT,
Fisheries research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W75-09135

RETARDATION OF FIN REGENERATION IN FUNDULUS BY SEVERAL INSECTICIDES,
Rutgers - the State Univ., New Brunswick, N. J. Dept. of Zoology; and Rutgers - the State Univ., New Brunswick, N. J. Dept. of Physiology.
J. S. Weis, and P. Weis.
Transactions of the American Fisheries Society, Vol 104, No 1, p 135-137, 1975. 1 tab, 14 ref.

Descriptors: *Killfish, *Teleosts, *Insecticides, *DDT, Aquaria, Toxicity, Mortality, Suppressants, Inhibitors, Enzymes, Mode of action, Water pollution effects, Carbamate pesticides.
Identifiers: *Malathion, *Parathion, *Sevin, *Caudal fins, *Organophosphorous pesticides, Acetycholinesterase.

Regeneration of caudal fins in Killifish (Fundulus) was retarded by treatment with 10 micrograms/liter (10 ppb) of DDT, Malathion, Parathion and Sevin. Although DDT was quite toxic to the fish, it did not retard regeneration as much as the other insecticides, showing significant retardation only after 2 weeks. The other three retarded regeneration in the first week and are all acetylcholinesterase inhibitors. There may be a relationship between acetylcholinesterase inhibition and fin regeneration, although the effect on regeneration was probably not directly related to this enzyme's inhibition. (Katz)
W75-09136

VEGETATION OF SWAMPS RECEIVING REACTOR EFFLUENTS,
Savannah River Ecology Lab., Arken, S.C.
J. E. Irwin, R. R. Sharitz, and E. J. Christy.
Oikos, Vol 25, No 1, p 7-13, 1974. 2 fig, 2 tab, 19 ref.

Descriptors: Swamps, *Nuclear reactors, *Vegetation effects, *Effluents, *Thermal pollution, Flooding, Hardwood Forests, Plant-water-soil relationships, Ecosystems, Nutrients, Environmental effects, Nuclear power plants, Root systems, Silting, Water levels, Vegetation regrowth, Speciation, *South Carolina.
Identifiers: *Swamp forests, Seasonal flooding, Flora, Forest canopy, River swamps, *Savannah River(SC).

Vegetational properties of mixed hardwood swamps of the Savannah River exposed to different thermal regimes from the release of nuclear reactor effluents were compared on the bases of floristic similarity, importance values of the dominant species, and diversity. Floristic composition was greatly altered by high water temperatures and by increased flooding and silting associated with the discharge of reactor effluents. Although the forest canopy was destroyed, diversity of the herbaceous flora remained high under conditions of thermal loading and post-thermal recovery. Trees comprise 40% of the species present in the undisturbed swamp habitat and less than 10% in the stressed areas. Successional recovery of the swamp following removal of stress is slow. (Katz)
W75-09137

A TECHNIQUE TO PROLONG THE INCUBATION PERIOD OF BROWN TROUT OVA,
Imperial Chemical Industries Ltd., Brixham (England). Brixham Research Lab.
For primary bibliographic entry see Field 5A.
W75-09138

TOXICITY OF COPPER AT TWO TEMPERATURES AND THREE SALINITIES TO THE AMERICAN LOBSTER (HOMARUS AMERICANUS),
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
D. W. McLeese.
Journal of the Fisheries Research Board of Canada, Vol 31, No 12, p 1949-1952, December 1974. 2 tab, 17 ref.

Descriptors: *Lobsters, *Copper, *Salinity, *Water temperature, *Lethal limit, *Toxicity, *Heavy metals, Environmental effects, Mortality, Water pollution effects.
Identifiers: *LT50.

Toxicity of copper to lobsters (Homarus americanus) was studied to provide a measure of lethal concentrations and to observe whether the toxicity is affected by temperature and salinity. The time to 50% mortality at a particular lethal concentration of copper was longer at 5C than at 13C but it was not affected by salinities of 20-30%. The lethal copper threshold was close to 56 micrograms/liter. (Katz)
W75-09139

THERMAL TOLERANCE OF EGGS AND LARVAE OF HAWAIIAN STRIPED MULLET, MUGIL CEPHALUS L.,
Oceanic Inst., Waimanalo, Hawaii.
J. R. Sylvester, and C. E. Nash.
Transactions of the American Fisheries Society, Vol 104, No 1, p 144-147, 1975. 1 fig, 3 tab, 24 ref.

Descriptors: *Mullets, *Incubation, *Temperature control, Fish, *Water temperature, *Larval growth stage, *Fish eggs, *Environmental effects, Reproduction, Graphical analysis, Graphical methods, Life cycles, Water Quality, Heated water, Water cooling, Marine fish, Metabolism, Spawning, Hatching, Mortality, Breeding, Fertilization, Model studies, Nutrient requirements, Zooplankton, Productivity, Dissolved oxygen, Sea water, Aquatic Environment, Equations, Equipment, Aquaria, Design, Statistical analysis, Water pollution effects.
Identifiers: Mugil cephalus, *Thermal tolerance, Logarithmic transformations, Hypohysation, Technique.

Relationships between temperature and mortaility of eggs and survival of the larvae are described for the striped mullet Mugil cephalus. Eggs were incubated at temperatures between 1.0 and 40.5C. Mortalities were least (4.2%) within the range 22.7-23.3C. Hatching time was inversely related to temperature. The equation $Y=3.6674 - 1.5240X$ describes the relation between incubation time and temperature over the range of 11-30C. Larvae were exposed to temperatures between 2.7 and 32.9C. Survival up to 12 days was greatest (19.9%) at a mean temperature of 24.9 (range 24.5-25.3C). Results suggest that optimum temperatures for egg development and hatching occur at temperature. levels which are inefficient or inimical for larvae growth and development. (Katz)
W75-09140

EFFECT OF DISSOLVED OXYGEN CONCENTRATION ON THE ACUTE TOXICITY OF CADMIUM TO THE MUMMICHOG, FUNDULUS HETEROCLITUS (L.), AT VARIOUS SALINITIES,
National Marine Water Quality Lab., West Kingston, R.I.
R. A. Voyer.
Transactions of the American Fisheries Society, Vol 104, No 1, p 129-134, 1975. 1 fig, 3 tab, 18 ref.

Descriptors: *Heavy metals, *Cadmium, *Dissolved oxygen, *Lethal limit, *Toxicity, *Salinity, Freshwater fish, Water pollution sources, Chemical wastes, Environmental effects, Laboratory studies, Structural design, Statistical analysis, Tissue analysis, Mortality, Fish physiology, Oxygen demand, Chlorides, Inorganic compounds, Water pollution effects.
Identifiers: *Fundulus heteroclitus, *TL50, Mummichogs.

The resistance of mummichogs, Fundulus heteroclitus, to acute cadmium poisoning was not influenced by reductions in dissolved oxygen levels to about 4 mg/liter at selected salinities. Fish were acclimated to either test salinities (10, 20, and 32%) or to 32% and then exposed to 10 and 20%. Results suggest cadmium as being the only source of significant variance influencing response. Histological response of mummichogs' exposure to cadmium is discussed. (Katz)
W75-09141

ACUTE TOXICITIES OF A POLYCHLORINATED BIPHENYL (PCB) AND DDT ALONE AND IN COMBINATION TO EARLY LIFE STAGES OF COHO SALMON (ONCORHYNCHUS KISUTCH),
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
M. T. Halter, and H. E. Johnson.
Journal of the Fisheries Research Board of Canada, Vol 31, No 9, p 1543-1547, 1974. 2 tab, 15 ref.

Descriptors: Fry, *Aroclor, *Polychlorinated biphenyls, Hatching, *Fish eggs, *Toxicity, *Pesticides, *Salmon, *DDT, Clorinated Hydrocarbon pesticides, Lethal limit, Water pollution effects.
Identifiers: Synergistic effects, *Coho salmon.

Egg hatchability, mean time to hatching, and alevin survival and growth decreased when coho salmon eggs and alevins were exposed at 12-14C to 4.4 mg/liter Aroclor 1245 or higher until 4 weeks after hatching, and to 15 mg/liter or more until 2 days before hatching. Premature hatching occurred in all egg groups exposed to the PCB. The median survival times of fry exposed to Aroclor 1254-DDT combinations for two weeks were similar to those after exposure to the various concentrations of DDT alone. The more rapid reaction time to DDT is suggested as the basis for lack of additive toxicity. (Katz)
W75-09142

VERTEBRAL DAMAGE TO MINNOWS PHOXINUS PHOXINUS EXPOSED TO ZINC,
Umea Univ. (Sweden). Dept. of Biology.
B-E. Bengtsson.
Oikos, Vol 25, No 2, p 134-139, 1974. 7 fig, 2 tab, 17 ref.

Descriptors: *Zinc, *Minnows, *Animal pathology, Metals, Pollutants, Lethal limit, Mortality, Growth rates, Reproduction, Fish behavior, Toxicants, Water pollution effects, Organophosphorus pesticides, Symptomology.
Identifiers: *Phoxinus phoxinus, *Sublethal effects, *Vertebral damage(Fish).

Adult minnows exposed to different concentrations of Zn(NO3)2 in fresh water developed hemorrhages and lesions. Vertebral damage occurred between 0.20 and 2.4ppm Zn2+ which is below the 96-hr LC50 dosage. The similarity between the symptomology of zinc and organophosphates is discussed. (Katz)
W75-09144

MODEL FOR ACCUMULATION OF METHYL MERCURY IN NORTHERN PIKE ESOX LUCIUS,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W75-09145

EXPERIMENTAL STUDIES ON THE EFFECTS OF COPPER ON A MARINE FOOD CHAIN,
Marine Lab., Aberdeen (Scotland).
D. Saward, A. A. Stirling, and B. G. Topping.
Marine Biology, Vol 29, No 4, p 351-361, 1975. 11 fig, 1 tab, 34 ref.

Descriptors: *Copper sulfate, *Food chains, *Path of pollutants, *Bioassay, Environmental effects, Copper, Toxicants, Pollutants, Photosynthesis, Growth rates, Metabolism, Food webs, Copper compounds, Biomass, Inorganic pesticides, Phytoplankton, Laboratory tests, Absorption, Adsorption, Sands, Crustaceans, Water pollution effects, Methodology, Lethal limit, Water pollution effects.
Identifiers: *Plaice, Pleuronectes platessa, *Tellina tenuis, Bioaccumulation, Tissue analysis, Sublethal effects.

Effects of copper sulfate on a marine food chain were investigated in a laboratory test. The food chain consisted of phytoplankton, the bivalve Tellina tenuis and the plaice Pleuronectes platessa. Copper dose rates of 10, 30 and 100 micrograms Cu/l were investigated. Copper levels in water, sand, algae, T. tenuis shell and flesh, and plaice muscle and viscera were measured. Copper accumulated in sand, T. tenuis flesh and shell, and plaice viscera. Accumulations were dose-dependent and no plateau concentrations were reached. The effects of copper on phytoplankton metabolism and on growth and condition of T. tenuis and plaice were investigated. (Katz)
W75-09146

ACCUMULATION OF 3,4,3',4'-TETRACHLOROBIPHENYL AND 2,4,5,2',4',5'- AND 2,4,6,2',4',6' - HEXACHLOROBIPHENYL IN JUVENILE COHO SALMON,
National Marine Fisheries Service, Seattle, Wash.
For primary bibliographic entry see Field 5A.
W75-09148

REPRODUCTIVE CYCLES OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) IN A COOLING RESERVOIR,
Savannah River Ecology Lab., Aiken, S.C.
D. H. Bennett, and J. W. Gibbons.
Transactions of the American Fisheries Society, Vol 104, No 1, p 77-82, 1975. 1 fig, 2 tab, 17 ref.

Descriptors: *South Carolina, *Environmental effects, *Heated water, *Fish reproduction, *Bass, Water temperature, *Fish physiology, Reservoirs, Gonads, Freshwater fish, Sexual maturity, Heat flow, Temperature control, *Thermal pollution, Fish behavior, Animal metabolism, Growth stages, Life Cycles, Biorhythms, Photoperiod, Nuclear powerplants, Water pollution effects.
Identifiers: *Centrarchid, *Micropterus salmoides, Gonosomadic indices, Savannah River Plant(SC).

Annual reproductive cycles of largemouth bass collected in the heated area of a 1120-hectare reservoir on the Savannah River Plant, South Carolina, receiving thermal effluent were similar to cycles from bass collected in unheated waters during 1969 and 1970. Average maximum monthly temperatures at the heated area exceeded those in unheated waters by greater than 10C for 2 years. Few monthly differences in gonosomatic indices were found between heated and unheated areas. Earlier attainment of maximum gonadal size and the presence of significantly larger juvenile bass at the heated area suggested that reproduction might be accelerated by thermal discharge. However, gonadal condition indicated that the reproductive period started in March and continued through April in both areas. Reproduction may have been advanced in some heated-area bass, although this was not obvious from overall changes in the reproductive cycles of bass from unheated areas. (Katz)
W75-09150

SURVIVAL OF LARGEMOUTH BASS EMBRYOS AT LOW DISSOLVED OXYGEN CONCENTRATIONS,
New York Cooperative Fishery Unit, Ithaca.
R. G. Dudley, and A. W. Eipper.
Transactions of the American Fisheries Society, Vol 104, No 1, p 122-128, 1975. 2 fig, 2 tab, 18 ref.

Descriptors: *Bass, *Sunfishes, Hatching, *Mortality, *Embryonic growth stage, *Larval growth stage, Environmental effects, *Dissolved oxygen, Movement, Water circulation, *Biomass, Water temperature, Temperature control, Structural design, Construction material, Construction, Instrumentation, Dissolved oxygen analyzers, Fish reproduction, Fish physiology, Water quality, Fertilization, Fish eggs, Mathematics, Life cycles, Growth stages, Graph analysis, Nutrient requirements, Equipment, Laboratory tests, Equations.
Identifiers: Micropterus salmoides, Survival rates.

Low oxygen concentrations were identified that significantly decreased survival of largemouth bass (Micropterus salmoides) embryos incubated at three temperatures in both stationary and moving containers. Embryos developed and hatched at oxygen concentrations of 1.0, 1.1 and 1.3 mg/liter at temperatures of 15, 20 and 25C, respectively, but concentrations below 2.0, 2.1 and 2.8 mg/liter significantly lowered survival. Most mortality at these oxygen concentrations occurred during hatching. At oxygen concentrations below 1.0 mg/liter, survival during the pre-hatching period was higher among those groups of embryos that were moved slowly up and down during incubation than among unmoved embryos; however, moved embryos suffered nearly complete mortality during hatching at all oxygen concentrations. Possible explanations of results were expressed. (Katz)
W75-09151

USE OF A SUDDEN TEMPERATURE DECREASE TO REDUCE THE EXCITABILITY OF CHANNEL CATFISH DURING HANDLING,
Southern Illinois Univ., Carbondale. Fisheries Research Lab.
W. K. Anderson, and W. M. Lewis.
The Progressive Fish-Culturist, Vol 36, No 4, p 213-215, October 1974. 3 tab, 2 fig, 2 ref.

Descriptors: *Channel catfish, *Commercial fish, *Heated water, *Temperature, *Aquiculture, Fish behavior, Mortality, Respiration, *Fish harvest, *Fish farming, Catfishes, Cooling, Water pollution effects.
Identifiers: *Thermal shock, *Fish handling.

'Thermal shock' induced by a rapid change of water temperature, from 80 degrees F to 60 degrees F, was examined as a method of reducing excitability of channel catfish during handling. Abnormal behavior, respiration and mortality were monitored during testing. Results indicated that yearling channel catfish can be successfully controlled by instantaneous transfer of fish from 80 degrees F to 60 degrees F. Following transfer, the fish can be held at the lower temperature for at least eight hours and can be returned to 80 degrees F water without tempering. (Katz)
W75-09153

EFFECTS OF REDUCED OXYGEN ON EMBRYOS AND LARVAE OF THE WHITE SUCKER, COHO SALMON, BROOK TROUT AND WALLEYE,
National Water Quality Lab., Duluth, Minn.
R. E. Siefert, and W. A. Spoor.
In: The Early Life History of Fish, Proceedings of an International Symposium, DunStaffnage Marine Research Laboratory, Scottish Marine Biological Association, Oban, Scotland. May 17-23, 1973, p 487-495 (1973). 4 tab, 15 ref.

Descriptors: *Larval growth stage, *Embryonic growth stage, *Dissolved oxygen, *Laboratory tests, *Brook trout, *Walleye, Salmonids, Bioassay, Fish eggs, Mortality, Growth rates, Temperature.
Identifiers: *White sucker, *Coho salmon.

The effects of continuous-reduced dissolved oxygen concentrations were determined on the embryos and larvae of the white sucker, coho salmon, brook trout and walleye from egg fertilization until the larvae were feeding. White suckers and walleye were not harmed at an oxygen concentration of 50% saturation. Development of white suckers was inhibited at 25% saturation, and walleye survival dropped at 35% saturation. Developmental delay and mortality in coho salmon increased with each reduced oxygen concentration tested including the highest reduced tension, 50% saturation. Some slight delays of brook trout development occurred at all reduced oxygen tensions tested, but marked effects on development and poor survival occurred only at 20% saturation and below. (Katz)
W75-09154

BIOASSAY METHODS OF THE NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD,
National Swedish Environment Protection Board, Stockholm. Research Lab.
For primary bibliographic entry see Field 5A.
W75-09155

SWEDISH PERSPECTIVES ON MERCURY POLLUTION,
Institute for Water and Air Pollution Research, Stockholm (Sweden). Dept. of Biology.
A. Jernelov, L. Landner, and T. Larrson.
Journal Water Pollution Control Federation, Vol 47, No 4, p 810-822, April 1975. 2 fig, 2 tab, 52 ref.

Descriptors: *Mercury, *Heavy metals, *Reviews, *Biodegradation, *Mathematical models, Metals, Food chains, Pollution abatement, Water pollution control, Water pollution sources, Research priorities, Path of pollutants, Sediments, Environmental effects, Water pollution effects.
Identifiers: *Biological methylation, Bioaccumulation, *Methyl mercury, Atmospheric mercury transport.

A historical review is given of the research on mercury in the aquatic environment. The present state of the art is depicted from the Swedish perspective. The circumstances leading to the discovery of the biological methylation of mercury are discussed, as well as the possible mechanisms and kinetics of the process. Factors influencing the

biomethylation of mercury are also listed. Recent studies on the accumulation of methyl mercury in food chains partly by means of mathematical modeling are described, as is the use of mathematical models to evaluate the outcome of different restoring measures applied to mercury-contaminated bodies of water. Current research priorities are atmospheric mercury transport, which causes the contamination of fish in remote lakes, and biological degradation of methyl mercury. (Katz)
W75-09157

TOXICITY OF KRAFT MILL WASTES TO AN ESTUARINE PHYTOPLANKTER,
North Carolina State Univ., Raleigh. Dept. of Zoology.
R. P. Rainville, B. J. Copeland, and W. T. McKean.
Journal Water Pollution Control Federation, Vol 47, No 3, p 487-503, March 1975. 8 fig, 12 tab, 18 ref.

Descriptors: *Toxicity, *Phytoplankton, Bleaching wastes, *Primary productivity, *Algae, *Pulp wastes, *Bioassay, Waste water treatment, Pre-treatment(Water), Chlorination, Food chains, Plankton, Estuaries, Industrial wastes, Chemical wastes, Wood wastes, Water pollution sources, Water pollution effects, Spectrophotometry, Effluents.
Identifiers: Sublethal effects, *Coccochloris elebans, Brown water.

The toxic sublethal effects of kraft mill effluents on phytoplankton in an estuarine environment were examined, with an evaluation of current waste-treatments used by the pulp and paper industry. The alga, Coccochloris elebans was used as the assay organism in studies of the sublethal effects of toxic substances. Untreated kraft mill wastes were toxic to C. elebans. After discharge and mixing with river water, the effluent is diluted to non-toxic levels. The toxicity of kraft mill wastes is greatly diminished at mills where aeration or long-term stabilization in the secondary treatment of wastes occurs; short-term settling is of little consequence in reducing toxicity. The toxicity of pulp mill waste water varies considerably among different mills and depends on several factors which must be evaluated, such as washing efficiency and the amount of water used. (Katz)
W75-09159

CONTAMINATION BY 51CR AND 109CD OF CULTURES OF THE ALGA DUNALIELLA BIOCULATA (CONTAMINATION PAR LE 51CR ET LE 109CD DE CULTURES DE L'ALGUE DUNALIELLA BIOCULATA), (IN FRENCH),
Institut Oceanographique, Paris (France).
For primary bibliographic entry see Field 5A.
W75-09160

STUDIES ON THE CYTOLYTIC EFFECTS OF SEASTAR (MARTHASTERIAS GLACIALIS) SAPONINS AND SYNTHETIC SURFACTANTS IN THE PLAICE PLEURONECTES PLATESSA,
Institute of Marine Biochemistry, Aberdeen (Scotland).
A. M. Mackie, H. T. Singh, and T. C. Fletcher.
Marine Biology, Vol 29, No 4, p 307-314, 1975. 3 fig, 4 tab, 22 ref.

Descriptors: *Toxicity, *Surfactants, Toxicants, Analytical techniques, Oxygen, Membranes, Biochemistry, Physiology, Water pollution effects, *Bioindicators.
Identifiers: *Pleuronectes platessa, Marthasterias glacialis, *Seastars, *Plaice, *Saponins, *Tissue analysis, Hemolysis, Histology.

The toxic effects of seastar saponins and synthetic surface-active agents were studied using the plaice as test animals. Solutions of M. glacialis saponins caused considerable, although non-uniform, damage to the gill epithelium, death resulting from a disturbance in the levels of oxygen, carbon dioxide, and sodium ions in the tissues and blood. Histological examination showed that solutions of the synthetic surfactants caused less damage to the gill epithelium than did the M. glacialis saponins. There was a linear relationship between the logarithm of the median hemolytic concentration and the logarithm of the median lethal concentration for the synthetic surfactants. Hemolytic inhibition experiments suggest that the M. glacialis saponins damage cell membranes by interacting with membrane cholesterol. (Katz)
W75-09161

TISSUE HYDROCARBON BURDEN OF MUSSELS AS POTENTIAL MONITOR OF ENVIRONMENTAL HYDROCARBON INSULT,
Naval Biomedical Research Lab., Oakland, Calif.
For primary bibliographic entry see Field 5B.
W75-09163

EFFECTS OF LOWERED DISSOLVED OXYGEN CONCENTRATIONS ON CHANNEL CATFISH (ICTALURUS PUNCTATUS) EMBRYOS AND LARVAE,
National Water Quality Lab., Duluth, Minn.
A. R. Carlson, R. E. Siefert, and L. J. Herman.
Transactions of the American Fisheries Society, Vol 103, No 3, p 623-626, July 1974. 1 tab, 11 ref.

Descriptors: *Dissolved oxygen, *Channel catfish, *Larval growth stage, *Embryonic growth stage, Freshwater fish, Laboratory tests, Temperature, Water pollution effects.

Channel catfish embryos and larvae were exposed to several reduced dissolved oxygen concentrations and control concentrations near air saturation at 25 and 28C (7.8 and 7.3 mg/liter respectively). At 25C survival was similar but slightly reduced at 60% and 70% saturation and was statistically less at 30% and 50% saturation. No embryos hatched at 20% and 25C. Survival to the end of the test at 28C was slightly reduced at 50%, 60% and 70% saturation and was statistically less at 30% saturation. At all reduced oxygen concentrations at 25 and 28C embryonic pigmentation was lighter, duration of hatch was extended, feeding was delayed and growth was reduced. (Katz)
W75-09164

NET PRIMARY PRODUCTIVITY OF PERIPHYTIC ALGAE IN THE INTERTIDAL ZONE, DUWAMISH RIVER ESTUARY, WASHINGTON,
Geological Survey, Menlo Park, Calif.
L. J. Tilley, and W. L. Haushild.
Available from Superintendent of Documents, US Government Printing Office, Washington, DC, 20402, for $3.15 in paper copy, $2.25 in microfiche.
Journal of Research of the US Geological Survey, Vol 3, No 3, p 253-259, May-June 1975. 3 fig, 4 tab, 16 ref.

Descriptors: *Algae, *Estuaries, *Tidal waters, *Washington, Growth rates, Data collections, Sessile algae, Analytical techniques, Environmental effects, Waste water disposal, Dredging, Tidal effects, Water quality, Evaluation, Water pollution sources, Water pollution effects.
Identifiers: *Periphytic algae, *Duwamish River estuary(Wash).

In a comprehensive study of the Duwamish River estuary, Seattle, Wash., investigations of the amount of algal biomass produced or deposited in the estuary included an estimation of the rate of growth of attached algae. New primary productivity of periphyton in the intertidal zone was determined. This productivity, measured as chlorophyll a concentration in the periphyton on fixed glass substrates, was 0.11 mg/sq m per week. The low productivity of attached algae on the substrates was attributed to out-of-water desiccation, and part of the variability in accumulation of periphytic algae was attributed to the time out-of-water exposure, which varied greatly from week to week owing to the irregularity of tides in the estuary. (Woodard-USGS)
W75-09189

LENGTH OF INCUBATION FOR ENUMERATING NITRIFYING BACTERIA PRESENT IN VARIOUS ENVIRONMENTS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
For primary bibliographic entry see Field 5A.
W75-09234

THE PEOPLE'S LAKE,
Save Lake Superior Association, Duluth, Minn.
K. T. Carlson.
Environment, Vol 17, No 2, p 16-20, 25-26, March 1975. 5 photo, 19 ref.

Descriptors: *Judicial decisions, *Water pollution, *Mine wastes, *Environmental effects, *Lake Superior, Minnesota, Legal aspects, Water law, Public health, Waste disposal, Solid wastes, Industrial wastes, Wastes, Aquatic environment, Water injury, Water pollution sources, Water quality, Water supply, Lakes.
Identifiers: Hazardous substances(Pollution), Injunctive relief, Coastal waters, Coastal zone management.

A mining company in Minnesota dumps 750 million gallons of wastewater, containing 67,000 tons of taconite waste and 60,000 pounds of dissolved solids into Lake Superior daily. In order to prevent pollution of the lake, a local environmental group sought to curtail the dumping operations. The problems and concerns of the group are described, as well as the history of the litigation. The plaintiffs fought a long and tedious battle to prove that the particular form of pollution was harmful. Concern was expressed that the company's operations were causing the irreparable harm to aquatic life and the drinking water supply. Central to the controversy was whether asbestos fibers in the waste material were cancer causing. Balanced against the factors of environmental protection and public health was the fate of 3,200 workers who faced loss of their jobs if the plant were closed. The district court ordered immediate curtailment of the discharge, but was reversed by the circuit court. The Supreme Court, without comment refused to reinstate the order. (Fernandez-Florida)
W75-09247

THE USE OF PHYSIOLOGICAL INDICATORS OF STRESS IN MARINE INVERTEBRATES AS A TOOL FOR MARINE POLLUTION MONITORING,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W75-09269

APPLICATION OF THE PHOSPHORUS-LOADING CONCEPT TO EUTROPHICATION RESEARCH,
Canada Centre for Inland Waters, Burlington, (Ontario).
P. J. Dillon.
Scientific Series No 46, 14 p, 1975, 5 fig, 8 tab, 45 ref.

Descriptors: *Phosphorus, *Chlorophyll, *Primary productivity, *Eutrophication, Water pollution, Ecosystems, Great Lakes.
Identifiers: *Phosphorus-loading, Water retention time.

Recent advances in the study of eutrophication include the improvement of Vollenweider's (The Scientific Basis of Lake and Stream Eutrophication, with Particular Reference to Phosphorus and Nitrogen as Eutrophication Factors, Technical Re-

port OECD, Paris DAS/CS1/68, Vol 27, p 1-182, 1968) original phosphorus-loading-mean depth relationship to take into account the water retention time of the lake. The relationship between phosphorus loading and phosphorus concentration has been investigated, and correlations between phosphorus loading and primary production for the Great Lakes and between spring phosphorus concentration and summer chlorophyll concentration for a wide variety of lakes have been developed. A number of lakes have undergone reductions in phosphorus load; in those where the reduction was significant, the lakes have responded favorably. (Env. Canada)
W75-09287

HUCHO HUCHO L. IN MARAMURES WATERS, (IN ROMANIAN),
Institutul Pedagogic Baia-Mare (Rumania).
For primary bibliographic entry see Field 5G.
W75-09304

THE STUDY ON THE AQUATIC INSECT FAUNA OF THE MATSUKAWA AND YONAKO RIVERS (MINERAL ACID POLLUTED RIVER), (IN JAPANESE),
Rissho Women's Coll., Koshigaya (Japan).
For primary bibliographic entry see Field 5B.
W75-09316

PLANKTON, CHEMISTRY, AND PHYSICS OF LAKES IN THE CHURCHILL FALLS REGION OF LABRADOR,
Waterloo Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 2H.
W75-09317

BIOLOGICAL VIEW OF PROBLEMS OF URBAN HEALTH,
John Curtin School of Medical Research, Canberra (Australia). Dept. of Human Biology.
For primary bibliographic entry see Field 6G.
W75-09332

5D. Waste Treatment Processes

PURIFICATION OF INDUSTRIAL AND MUNICIPAL WASTE WATER.
French Patent 36854V/20. Applied October 25, 1973. Issued June 28, 1974. Derwent French Patents Report, Vol 5, No 35, p 4, 1974.

Descriptors: *Patents, *Waste water treatment, *Carbon, *Organic compounds, *Municipal wastes, Dissolved oxygen, Color, Water purification.
Identifiers: *Total organic carbon.

A process for the purification of industrial and municipal waste water was patented. It reduces total organic carbon content and improves the color of water contaminated by organic compounds. The process is performed at 0 to 100C. An amount of the contaminated water is introduced into a tank, adding active carbon to form a suspension. The mixture is stirred and contacted with an 02 containing gas, preferably by setting up a 1 to 9 mg/liter dissolved oxygen content. The amount of active carbon added provides a 50 to 200 g/liter suspension density of the contaminated water. After treatment active carbon may be separated from the water and reused for treating a further charge of water. Waste water color can be reduced from 500 to 1000 to less than 100 APHA color units. (Prague-FIRL)
W75-08852

SEWAGE PROCESSING,
I. S. Turovskii, L. L. Goldfarb, and B. L. Gordon.
Soviet Patent SU 403632. Applied October 26, 1973. Issued March 20, 1974. Soviet Inventions Illustrated, Vol 5, No 37, p 1, 1974. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Sludge treatment, Capital costs, Operating costs, *Storage tanks, Aeration, Storage, Dewatering, *Waste water treatment, *Coagulation.

A sewage treatment process was patented which coagulates chemicals, reduces emergency sludge areas, and eliminates a dehelminthisation chamber. Precipitates are fermented in a reservoir-storage tank, with aeration for 2.5 to 3.2 cu m/hr/cu m of precipitate for 12 to 48 hours, and then heated at 60 to 70 degrees c. These are then coagulated and dewatered. The sewerage supply pipes go from settlers and a sludge thickener to an aeration and storage tank. Pipes supply air to the latter. A heater, a mixer, a coagulant doser, a distributer, a combustion chamber, a drum vacuum filter, a belt conveyor, and a container for dewatered precipitate are illustrated. There is an emergency aerator-storage tank supplied with one cu m/cu m/hour of air. Heating and aeration make the materials non toxic and cut viscosity so that less ferric chloride must be added. After dewatering to 57% H2O, the resultant liquid can then be stored. Capital costs are cut 2.5 fold and operating costs are cut by 15 percent. (Prague-FIRL)
W75-08853

AUTOMATIC PRIMING OF WASTE-WATER PUMP.
French Patent 65042V/37. Applied November 13, 1973. Issued July 12, 1974. Derwent French Patents Abstracts, Vol 5, No 37, p 3, 1974.

Descriptors: *Patents, Equipment, *Waste water treatment, *Pumps, Automation, Drainage, Hydraulic machinery, Valves, Tanks.
Identifiers: *Waste water tanks.

An automatic priming system for a waste water pump was patented which will overcome siphoning due to failures in downstream drainage. This pumping unit is used to evacuate a waste water tank, especially one associated with a domestic unit, under level control, into a drainage system. The system has an inclined side-arm, branching below the non-return valve downstream of the pump, fitted with a valve which permits flow of air in either direction, but closes under pressure when the pump is in operation. The unit has a vertical Mono pump, below which is a rotary disc mill disintegrator. Backflow from the drainage system is prevented by a non-return valve. Should there be pressure loss in the drainage system due to leakage, siphoning through the non-return valve occurs, but it is prevented from de-priming the pump by entry of air or liquid through the sidearm. This serves to bleed away air during the initial start-up of the pump, and to equilibriate pressure in the pump when the non-return valves is closed, so that re-starting is facilitated. (Prague-FIRL)
W75-08854

AUTOMATIC CHAMBER FILTER PRESSES FOR WASTEWATER TREATMENT, (AUTOMATISCHE KAMMERFILTERPRESSEN ZUR ABWASSERBEHANDLUNG).
Galvanotechnik, Vol 65, No 7, p 612, July, 1974. 1 fig.

Descriptors: *Waste water treatment, Automation, Industrial wastes, Municipal wastes, Sewage sludge, Design, Filters, *Filtration, *Dewatering.
Identifiers: *Filter presses, *Filter cokes.

Netzsch type chamber filter presses for the dewatering of industrial and municipal sewage sludge are described. The filter presses are designed for filter pressures of up to 15 atm, and are also available in fully automatic design. With a filter surface of 4 sq m per chamber, one filter press accomodate up to 120 chambers. The filtrate obtained is clear and can be discharged into the sewer system, while the filter cake has a dry content of 40 percent. (Takacs-FIRL)
W75-08855

GERMFREE WATER PRODUCED BY OZONIZERS (KEIMFREIES WASSER DURCH OZONANLAGEN),
For primary bibliographic entry see Field 5F.
W75-08856

APPARATUSES AND PROCESSES FOR MODERN WASTE WATER TREATMENT AND SEWAGE SLUDGE DISPOSAL (GERAETE UND VERFAHREN NEUZEITLICHER ABWASSEREINIGUNG UND KLAERSCHLAMMBESEITIGUNG),
F. Karnovsky.
Energie und Technik, Vol 26, No 6, p 140-144, June, 1974.

Descriptors: *Waste water treatment, *Sewage sludge, *Automation, *Waste disposal, *Filtration, Dehydration, Organic matter, Sewage treatment, Centrifugation.
Identifiers: Polyvinyl chloride, Flocor, Vacuum filtration, Pressure filters, Percolation.

Modern equipment and processes for waste water and sewage sludge treatment are described. Trouble-free operation of trash racks is possible by new automatic counterflow trash racks. Modern sand sifters remove most of the organic matter from and dehydrate sand effectively. The material retained by trash racks is pressed for dehydration and subsequent incineration as such wastes can not be safely disposed of on sanitary landfills. The biological treatment stages operate with high-efficiency surface aerators or compressed-air aerators which also provide for intense turbulence and mixing of the waste water with air. Percolating bodies based on PVC, such as Flocor and Hydropak, are commercially available. Sludge dehydration is carried out mainly by vacuum filtration, pressure filters, filter presses for continuous or batch operation, or by centrifuges. The dehydration requires thermal or chemical conditioning to improve dehydration and increase homogeneity. Digested sludge is pasteurized prior to application to an agricultural land. (Takacs-FIRL)
W75-08857

DESIGN BASIS FOR THE ROTATING DISC PROCESS,
I. H. Steels.
Effluent and Water Treatment Journal, Vol 14, No 8, p 431-432, 436-437, 439, 441-445, August, 1974. 3 fig.

Descriptors: *Biological treatment, *Sewage treatment, Sedimentation, Activated sludge, Percolation, *Waste water treatment, Biomass, *Design criteria.
Identifiers: *Rotating disc processes, Clarification.

The Rotating Disc Process is a high rate biological stage of a conventional sewage treatment plant, used for treatment of sewage as well as industrial effluent waste water. The disc stage is normally preceded and followed by sedimentation and clarification tanks, of designs appropriate to their repesctive plant sizes. The mechanical arrangement and operational process of a rotating disc plant are similar to those of ordinary percolating filters and activated sludge plants. A biological growth similar to that found in percolating filters grows on the surface of the discs of the Rotating Disc Plant. A freely circulating biomass is found in the plant's troughs, which aids in the biological treatment of waste water. Turbulence is created by the rotating discs to keep the biomass in motion. An increase of disc rotation speed reduces the thickness of biomass growing on the discs and limits the role of the disc to that of introducing oxygen to the biomass present in the troughs. With the system of rotating discs, it is possible to introduce the biomass alternately into the waste water and the air without it being necessary to move the waste water or the air. Thus biological treatment is possible with a reduction in energy,

since only the biomass of the plant must be moved. On application of the rotating disc plant is in secondary treatment of domestic sewage from single houses or very small communites. Septic tanks receiving such wastes have been equiped with packaged rotating disc plants inclusive of their own final clarification sections. (Prague-FIRL)
W75-08860

NEW SERIES OF STANDARD DESIGNS OF BIOLOGICAL WASTE WATER TREATMENT WITH CAPACITIES OF 100, 200, 400, AND 700 CUM,/DAY, (IN RUSSIAN),
M. N. Sirota.
Vodosnabzheniye i Sanitarnaya Teknika, No 7, p 12-14, 1974. 2 fig, 1 tab.

Descriptors: *Biological treatment, *Waste water treatment, *Municipal wastes, Biochemical oxygen demand, Aeration, Pollution abatement, *Design criteria, Water quality standards.
Identifiers: Mechanical aeration, Pneumatic aeration.

Standardized biological waste water treatment plants with unit capacities of 100, 200, 400, and 700 cu m/day, intended to serve communities with 300 to 5000 inhabitants, are described. These waste water treatment plants are designed for municipal and similar effluents with relatively low BOD5 which is reduced to 20 to 25 mg/liter as a result of the biological purification. The principle of prolonged aeration or full oxidation is employed to combine biological purification with partial mineralization of the sewage sludge. The waste water to be treated is aerated by means of mechanical or pneumatic aerator for one day, after which the sludge is settled and subsequently dried in beds, and the purified water is discharged into the recipient. While mechanical aeration is less economical than pneumatic aeration, it is superior to the latter in efficiency in the case of permanent high pollutant loads. (Takacs-FIRL)
W75-08861

SEWAGE PURIFICATION TANK SEPARATION SYSTEM (OSUI JOKASO NI OKERU BUNRI SOCHI),
K. Hanakawa.
Japanese Patent 49-21012. Applied August 7, 1970. Issued June 6, 1974.

Descriptors: *Patents, *Sewage treatment, *Separation techniques, Tanks, Settling basins, Filters, *Waste water treatment, Water purification.
Identifiers: *Sewage purification, Japan.

When separating solid and sewage water by a sludge fermentation settling tank, usually the liquids and solids are separated by a net filtering. However, the accumulated solids and semi-solids on the net require some removal device so that part of the accumulation will not dry up and clog the net filter. A device designed to solve this problem was patented. The structure has a sewage chamber, a separation chamber, and a sludge fermentation (putrification) settling chamber. Each chamber's partition wall has an opening. In the separation chamber, a horizontal separation board with comb-like fine filter is placed either level or slightly inclined. Under the separation board, a water wheel turns with the separated trickling water and conveys the movement to an endless rotation belt. As the water wheel moves by the water separated from the scum it moves the belt and moves the comb filter so that the accumulated sludge will be moved and dropped into the sludge settling tank. (Seigle-FIRL)
W75-08862

BIOLOGICAL FERTILIZER PRODUCTION - BY TREATMENT OF SEWAGE SLUDGES WITH SULFITE LIQUORS.
Belgian Patent 56760V/32. Applied March 2, 1973. Issued July 1, 1974. Derwent Belgian Patents Report, Vol 5, No 32, p 4, September, 1974.

Descriptors: *Patents, *Fertilizers, *Sewage sludge, *Sulfite liquors, *Waste water treatment, Industrial wastes, Hydrogen ion concentration, Farm wastes, Recycling.
Identifiers: Biological fertilizer production, Clarification.

Biological fertilizer production by treatment of sewage sludges with sulphite liquors is described. Fertilizer is produced using waste waters, such as agglomerated sewage, industrial waste waters, or agricultural waste liquors. These sewage sludges, obtained when the waste waters are clarified, are mixed with a residual sulphite liquor and reacted at an optimum pH of less than 6 in the presence of an oxidising agent. The treated sludges are then mixed with ground vegetable material and left to be transformed into a biological fertilizer by traditional methods. (Prague-FIRL)
W75-08863

UNDERDRAIN STRUCTURE FOR WASTE EFFLUENT FILTER AND METHOD OF USING SAME,
Hydro-Clear Corp., Avon Lake, Ohio. (Assignee).
D. S. Ross.
United States Patent 3,840,117. Applied April 30, 1973. Issued October 8, 1974. Official Gazette of the United States Patent Office, Vol 927, No 2, p 526, October, 1974. 1 fig.

Descriptors: *Patents, *Filtration, *Sewage effluents, Drains, Liquids, Equipment, Tanks, *Waste water treatment, Filters.
Identifiers: Underdrains.

An underdrain structure and method for waste effluent filtration is described. A waste effluent filter is included in a tank with a filter bed of particulate material, an underdrain cavity, and a lower portion. Means for draining from the underdrain cavity filtered effluent after the filtered effluent has passed through the bed, means for allowing air to enter the underdrain cavity, and means for forcing liquid into the underdrain cavity where the air is compressed are provided. One feature of this equipment is an air distribution device secured in the underdrain cavity which defines several vertically extending chambers below the bed. Each chamber has an inner cavity, a lower open end opening into the underdrain cavity and at least one means for forming an aperture in the upper end where liquid is forced into the underdrain cavity. The apertures have a second area substantially smaller than the first area, and liquid closes the open ends and then forces air entrapped in the chambers up through the aperture and then through the bed. (Prague-FIRL)
W75-08864

SEWAGE AND MUNICIPAL REFUSE LIQUID PHASE COKING PROCESS,
Texaco Development Corp., New York.
H. V. Hess, R. F. Wilson, and E. L. Cole.
Canadian Patent 954,810. Applied June 15, 1971. Issued September 17, 1974. Patent Office Record, Vol 102, No 38, p 33-34, September, 1974.

Descriptors: *Municipal wastes, *Patents, Sewage, Solid wastes, Water clarification, Liquids, Sewage sludge, *Waste water treatment.
Identifiers: *Coking process.

A combination process for treating both municipal refuse and sewage was patented. Solid refuse is shredded and the shredded material obtained is mixed with a recycle stream of water resulting from a subsequent coking step to form a slurry. Non-combustible materials are removed from this slurry. The slurry is then mixed with sewage sludge, and the resulting mixture is coked under sufficient pressure to prevent the vaporization of water. Thus, grease, clean water, and clean coke are produced. (Prague-FIRL)
W75-08865

SLUDGE SETTLING DEVICE FOR SEWAGE FILTER SYSTEMS (OSUI ROKA SOCHI NI OKERU SURAJJI NO CHINKO BURNRI SHORI SOCHI),
J. Sasaki.
Japanese Patent 49-19659. Applied June 21, 1968. Issued May 25, 1974.

Descriptors: *Patents, Pumps, *Filters, *Sewage treatment, Equipment, Flocculation, Water purification, *Filtration, *Waste water treatment.
Identifiers: Sludge settling, Sewage filters, Japan.

A sludge settling device for sewage filter systems is reported. In the treatment tank, sewage water is supplied by a pipe submerged deep in the sludge settling chamber. The sewage rises above to reach multi-filter material installed at the top of the chamber. The sludge settling device is a funnel shaped receptacle with a small outlet into the sludge removal channel. Between the filter material at the upper part of the sludge treatment tank and the sludge settling chamber is a frame bar with many slits through which the sewage water rises into the filter material. Many thin wire-like fibers are suspended from the frame bar over the entire cross section of the sludge settling chamber. Fibrous material accelerate sludge flocculation around them while sewage water moves up the tank between the hanging fibers. The flocculated sludge, growing in size and weight, can drop and slip into the outlet of the settling chamber and is drawn out by a suction pump. The purified water above the filter is emitted into the purification tank through a magnetic valve and is discharged by a pump. (Seigle-FIRL)
W75-08866

OXIDATION DITCH FOR WASTE TREATMENT.
Australian Patent 452,527. Applied September 21, 1971. Issued September 5, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 33, p 3641, September, 1974.

Descriptors: *Patents, *Aeration, *Liquid wastes, Jets, Waste water treatment, *Oxidation lagoons, Aerated lagoons, Waste treatment.
Identifiers: *Oxidation ditch.

A method for the aeration treatment of waste liquid was patented. First the waste liquid is introduced into a ditch defining a continuous, substantially closed cource for liquid movement with a surface level well above the ditch bottom. This waste liquid is then impacted with high velocity jets of a mixture of air and water, which is admitted below the surface level. This process imparts a velocity of at least about 0.3 foot per second to the waste liquid while mixing the air with the liquid. The treated liquid is thus removed from the oxidation ditch. (Prague-FIRL)
W75-08867

WASTE WATER PURIFICATION SYSTEM (OSUI JOKA SOCHI),
Electric Industrial Co. Ltd., Osaka (Japan). Matsushita.
T. Jomoto, K. Shinogi, M. Oshibi, and T. Terada.
Japanese Patent 49-26661. Applied July 13, 1970. Issued July 11, 1974. p 91-96, 1974. 4 fig.

Descriptors: *Patents, *Sewage treatment, *Aeration, Disinfection, Equipment, *Waste water treatment, Settling basins.
Identifiers: *Settling tanks, *Aeration chambers.

A sewage purification system was patented in which the circulation of sewage current in the aeration chamber moves only along the walls of the tank. The system contains a settling tank within an aeration tank in order to save space. The unit has a separation room, an aeration chamber, a settling chamber, and a disinfection chamber. The separation room has a sewage pipe which supplies the sewage water while the aeration room has air dispersion pipes. The settling chamber has a narrow upper part and a flared middle; near the top is an overflow opening. A sediment exit near its bottom returns the sludge to the aeration tank. There is a space between the settling chamber partition wall and the aeration room wall in which sewage water can circulate and oxidize well. Since the settling chamber has a flared bottom and a narrow top, the supernatant liquid forms a deep layer at the top and does not receive the effects of the circulation in the aeration chamber. The sediment returns to the aeration chamber from the exit near the bottom. The supernatant liquid overflows into the disinfection chamber were a disinfectant is supplied. The cleaned liquid is then emitted from the discharge pipe. (Seigle-FIRL)
W75-08868

BIOLOGICAL PURIFICATION OF SEWAGE WATER.
Belgian Patent 61825V/35. Applied February 2, 1974. Issued August 12, 1974. Derwent Belgian Patents Abstracts, Vol 5, No 36, p 2, 1974.

Descriptors: *Patents, *Sewage treatment, *Biological treatment, Bacteria, Tanks, *Waste water treatment.
Identifiers: *Rotating discs.

A method of biological purification of sewage water is recorded. The installation for the secondary processing of this sewage water has a tank divided into a series of compartments. In each of these there are partly submerged rotating discs, so that the fluid passes through the tank divisions at a controlled rate of flow. The bacteria propagate themselves while exposed alternately to the sewage and to atmospheric oxygen on the disc surfaces. The area of these disc surfaces are compared to the volume of the liquid being processed as held at its optimum ratio. (Prague-FIRL)
W75-08869

SEWAGE TREATMENT TANK SCREENING STRUCTURE (OSHUI SHORISO YO SUKURIN KOZO),
T. Sugimoto.
Japanese Patent 49-28359. Applied December 28, 1970. Issued August 2, 1974. p 87-89. 4 fig.

Descriptors: *Patents, *Sewage treatment, Filters, Tanks, Equipment, Screens, *Waste water treatment, Filtration.
Identifiers: *Rotation drum screens.

A sewage purification device is described. In the system, sewage water led into a digestion tank or separation tank must first be filtered to remove solids. A simple filter screen quickly becomes clogged with the solids and requires frequent removal and washing. The use of sweeper does not solve this clogging problem. A rotation drum screen also solves the clogging very little. This device was designed to remove screen-clogging solids periodically or at a desired time. The structure has several semi-circular segments joined by an inclined common axis. Each segment has a stable screen with a semi-circular bottom and teeth that will fit into the gaps of the semicircular screen perfectly. The rotation drum screen also provides a sweeper for the solids. The sewage water is supplied from a high level by a pipe at the top of the inclination, so that the solid will be screened and swept. As the drum rotates, the swept solid gradually is pushed toward the lower part, and finally pushed off into the solid receptacle. (Seigle-FIRL)
W75-08870

SEWAGE TREATMENT METHOD UPS CAPACITY.
Chemical and Engineering News, Vol 52, No 33, p 6-7, August 1974.

Descriptors: *Bacteria, *Sewage treatment, *Sewers, *Digestion, Anaerobic conditions, Anaerobic digestion, Biochemical oxygen demand, Nutrient removal, Pipelines, California, *Waste water treatment.

Lathrop Laboratories, Fresno, California, has developed a sewage treatment process that uses a newly developed bacterial isolate and the sewage lines themselves as partial digesters. The bacterial isolate is not a normal constituent of feces. However, it multiplies in the anaerobic environment of most sewage lines and degrades waste without producing offensive odors. Tests of the process showed that it can achieve a great reduction in BOD, ammonia and nitrates concentration and hydrogen sulfide levels. The cost of treating one mgd was about $400 per month. The bacteria were developed from normal 'earth bacteria' and present no health or safety problems. They were grown in 2000 gallon nonpressurized tanks and metered into the sewage lines in appropriate amounts. The bacterial isolates could also be applied to rivers, lakes, and ponds, using crop dusting aircraft, to improve the ability of these bodies of water to assimilate sewage and other effluents. (Orr-FIRL)
W75-08871

GET READY FOR UNI-FLOW FILTERS,
Western Regional Research Lab., Berkeley, Calif.
W. M. Camirand, and K. Popper.
Water and Wastes Engineering, Vol 11, No 10, p 31-34, October 1974. 4 fig, 3 tab.

Descriptors: *Filters, *Municipal wastes, *Waste water treatment, Settling, Lime.
Identifiers: *Physical-chemical treatment, Uni-flow filters.

The uni-flow filter for the physical-chemical treatment of municipal waste water is described. This filter was invented as an inexpensive alternative to a settling tank for concentration of calcium hydroxide and magnesium hydroxide slurries in connection with an ion exchange desalination process. It has been tested as a solid liquid separator in a municipal sewage treatment scheme using modular mobile equipment. The filter itself is a vertical cloth tube between four and twenty feet long, which might be seen as a settling tank with permeable canvas walls. Input is at the top and a sludge discharge valve and a filtrate collector are located at the bottom. Solids are retained on the inside of the porous tube. Hydrostatic pressure forces the filtrate through the porous walls, and gravity effects the settling of solids within the tube. The simplified steps of the process are: comminution; liming; solid liquid separation; carbonation; additional solid liquid separation; and activated carbon treatment. Carbonation may be supplanted by ion exchange and the activated carbon treatment by reverse osmosis. In a 32-hour filtration of lime-treated municipal waste water with the uni-flow filter, biochemical oxygen demand was reduced by 78%, and suspended solids and E. coli were cut by 100%. Dissolved oxygen was increased from one ppm to 7.7 ppm. (Prague-FIRL)
W75-08872

SLUDGE DEWATERING,
K. G. Barnhill.
Industrial Water Engineering, Vol 11, No 5, p 21-24, September/October, 1974.

Descriptors: *Waste disposal, *Dewatering, Costs, Equipment centrifugation, Filtration, Sewage sludge, *Waste water treatment.
Identifiers: *Sludge dewatering.

A survey taken by the Washington Aqueduct Division reported that 57 of the 100 largest water treatment plants in the United States disposed of their sludges and backwash water to the nearest source of surface water. Waste flows from municipal waste water and water plants require treatment before final disposal. Optimum final disposal must be preceded by one or more dewatering steps. The degree of dewatering and the need for digestion are determined by the method of disposal, such as landfill, incineration, lagooning, or barging to sea. In choosing the optimal technique of dewatering, the following factors should be considered: availability of prior applicable experience; equipment operation, such as manpower requirements, operator skill needed, controls, hazards, and dependability; operating and capital costs; implementation problems, such as odors or chemical handling; and regulatory rules for pollution control. The techniques detailed included sludge dewatering by centrifugation, vacuum filtration, gravity sludge dewatering, sludge concentration, pressure filtration, and use of the belt filter press or the vertical screw press. (Prague-FIRL)
W75-08873

VIRUS INACTIVATION DURING TERTIARY TREATMENT,
Texas A and M Univ., College Station.
H. W. Wolf, R. S. Safferman, A. R. Mixson, and C. E. Stringer.
Journal of the American Water Works Association, Vol 66, No 9, p 526-531, September 1974. 2 fig, 11 tab, 14 ref.

Descriptors: *Alum, *Lime, *Tertiary treatment, *Viruses, *Disinfection, *Waste water treatment, Sedimentation, Coagulation, Filtration, Effluents.
Identifiers: Secondary effluents, Viral removal.

Use of a clarifier in both alum and lime modes is detailed, as applied to viral-removal efficiency. Recent calculations show the virus hazard to be about 10 tissue culture infectious doses/ml (TCID50/ml) of enteric viruses in waste water, a relatively low value. Tertiary treatment processes were studied at large-scale pilot plants. It was demonstrated that virus removals from secondary effluents by alum coagulation-sedimentation and coagulation-sedimentation-filtration processes are essentially the same as those found in smaller-scale studies. Removals of bacterial virus as high as 99.845 percent for coagulation-sedimentation and 99.985 percent for coagulation-sedimentation-filtration were found with an Al to P ratio of seven to one. High lime treatment of secondary effluents achieved very high degrees of virus removal; the percentage has not yet been quantified. Microbiologically, the results of these studies suggest that the high lime process should be applied to the disinfection of waste water. (Prague-FIRL)
W75-08874

WASTES MAY NOT BE A TREAT FOR PRETREATMENT.
Chemical Week, Vol 115, No 15, p 27-30, October 9, 1974.

Descriptors: *Chemical wastes, *Pre-treatment, Biochemical oxygen demand, Municipal wastes, Biological treatment, *Waste water treatment.
Identifiers: *Combined treatment, Organic chemical wastes.

While joint treatment of municipal and industrial wastes has been strongly advocated, sufficient pretreatment of chemical wastes is necessary. The problems associated with combining municipal and organic-chemical (industrial) wastes are discussed. For example, introduction of a readily degradable organic waste water to an activated sludge plant may require readjustment of organic loading. In another case, while the BOD in domestic sewage is primarily suspended and colloidal, and thus insensitive to temperature, soluble industrial waste waters require a biological

removal mechanism that is affected by temperature, resulting in a need for adjustment for low winter temperatures. Levels of necessary pretreatment are higher for discharge of industrial wastes to a physical-chemical treatment plant than to a biological waste treatment plant. Types of possible pretreatment to facilitate joint municipal-industrial plants include evaporation, addition of lime, freezing, or membrane processes, as well as a recommendation that organic chemical manufacturing processes be modified to cut down on the quantity of waste water and treatment inhibitors. While some organic chemical waste streams can never be treated together with municipal wastes because of their high toxicity levels, more joint treatment may be possible if organic chemical plants implement adequate pretreatment plans. (Prague-FIRL)
W75-08875

MUNICIPAL WASTEWATER BACTERIA CAPABLE OF SURVIVING CHLORINATION,
Texas Univ., Houston. School of Public Health.
E. M. Davis, and S. R. Keen.
Health Laboratory Science, Vol 11, No 4, p 268-274, October 1974. 4 fig, 11 ref.

Descriptors: *Chlorination, *Municipal wastes, *Pathogenic bacteria, *Bacteria, Public health, Coliforms, Municipal water, *Waste water treatment, Pollutant identification.

It was questioned whether certain municipal waste water bacteria may be capable of surviving chlorination and whether or not chlorination is an effective enough treatment method, in terms of public health. Selected diagnostic biochemical media were used to identify some of the bacterial species which survive chlorination of secondary treated municipal waste water and those species which demonstrated an ability to reestablish their populations with time. Fecal coliform, fecal streptococci, and total coliform were enumerated with further differentiation into lactose non-fermenters within and outside the family Enterobacteriaceae. It was determined that the vast majority of the waste water species which reestablished their populations within twenty-one days following chlorination were lactose non-fermenters not included in the Enterobacteriaceae. Many of those could be pathogenic under their own required conditions, and may constitute a threat to public health in receiving waters designated for contact recreation. (Prague-FIRL)
W75-08876

AN OUTLINE SCHEME FOR RE-USE OF MOGDEN SEWAGE EFFLUENT,
Fish (Robert) and Partners, London (England).
R. Fish, and J. Savage.
Water Services, Vol 78, No 943, p 300-303, September 1974. 3 fig.

Descriptors: *Water reuse, *Water conservation, Rivers, Effluents, *Sewage effluents, Environmental effects, Capital costs, *Sewage treatment, *Waste water treatment.
Identifiers: *River Thames.

Water reuse by effluent discharges to rivers is a common practice in water conservation in England and Wales. It was suggested that the River Thames might be used to deliberately arrange the reuse of effluents discharged to estuaries and tidal waters. The present outfall from the Mogden Sewage Purification Works discharges to the tideway at Teddington Weir, and might be reused if sewage effluent were diverted inland. A summary of how this Mogden effluent could be returned inland with a scheme for maximum extent and flexibility is given. Quantitative considerations such as volume of effluent, and qualitative considerations, such as meeting required water quality discharge to the Grand Union Canal system, are discussed. It was suggested that a flexible scheme using up to 60 mgd of the effluent from the Mogden sewage works could be based on the use of the Grand Union Canal and its branches as a main aqueduct to convey reclaimed effluent to points of demand. The scheme could provide 50 mgd raw water for public supply at a capital cost of between 60,000 and 70,000 pounds per million gallons, as well as providing water for second class industrial supply purposes. The costs of supplies by this scheme compare favorably with present costs of raw water supplied by conventional methods of water conservation. The plan also uses minimal land and creates minimal environmental disturbance. (Prague-FIRL)
W75-08877

HOW TO OPTIMIZE AN ACTIVATED SLUDGE PLANT,
R. J. Joyce, C. Ortman, and C. Zickefoose.
Water and Sewage Works, Vol 121, No 10, p 96-99, October 1974. 15 fig.

Descriptors: *Municipal wastes, *Waste water treatment, *Treatment facilities, *Activated sludge, Effluents, Hydraulic capacity, *Industrial wastes, Standards, *Oregon, Water quality standards.
Identifiers: Hillsboro(Ore), *Combined treatment.

The Hillsboro Oregon waste treatment plant treats both municipal wastes from its community and industrial wastes from four food plants. Until July, 1973, the treatment plant had trouble meeting effluent standards, due to large and random variations in plant loading. In order to control effluent standards, it was necessary to make fast measurements of organic loading, as well as other key variables. The activated sludge process is reviewed, in terms of its contact and stabilization steps, and the sludge conditioning time. The Hillsboro plant has a nominal hydraulic capacity of 2 MGD and a complete-mixing aeration tank, which is divided into four quadrants. Sludge conditioning time is quite flexible. The measurement and control actions for the plant are illustrated. Parameters considered for optimal ranges are the food/biomass ratio (F/M), the effluent organic pollutant (BOD5), the return sludge flow (RSF) and the waste sludge (WS). Control strategy is applied so that the F/M ratio, the settling volume for 5 minutes, and the respiration rate interact with each other. These bring corrective action in terms of increases or decreases in sludge conditioning time, returned sludge flow, and waste return flow. (Prague-FIRL)
W75-08878

FULL-SCALE TRIALS OF POLYELECTROLYTES FOR CONDITIONING OF SEWAGE SLUDGES FOR FILTER PRESSING,
M. J. D. White, and R. C. Baskerville.
Water Pollution Control, Vol 73, No 5, p 486-504, 1974. 6 fig, 4 tab, 21 ref.

Descriptors: *Polyelectrolytes, *Sewage treatment, *Filtration, Operation, Treatment facilities, Drainage, *Waste water treatment, Filters.
Identifiers: *Filter pressing.

Sewage sludge is known to be conditioned in the laboratory using polyelectrolytes. Full-scale operation was successfully tried by the Oadby sewage works, with pressing periods from two to five hours. The reasons for failures and disappointing results in the use of polyelectrolytes is discussed. The difficulties associated with the filter pressing of sludge after polyelectrolyte conditioning seems to be due mainly to blinding of the filter medium, to inadequate provision for the discharge of filtrate at a high rate, or to incorrect mixing techniques. Some of the difficulties of blinding the filter medium can be overcome by use of an in-line mixing system; the use of the press feed pump as an in-line mixer may be applied in certain cases. Regular cleaning of the drainage surfaces and the backs of the cloths is necessary to maintain a high rate of filtration flow associated with polymer-conditioned sludges. Thus, if precautions are taken to ensure that satisfactory conditioning is achieved, and that this sludge can then be transported to the press without breaking down the flocs excessively, and if the cloth and drainage surfaces are kept clean and clear, this method can be carried out, offering savings in both costs and time. (Prague-FIRL)
W75-08879

CONTROL SYSTEM FOR TOTSUKA-DAINI SEWAGE TREATMENT PLANT (IN JAPANESE),
Y. Hattori, H. Matsumoto, Y. Matsuzaki, M. Endo, and Y. Negoro.
Toshiba Review, Vol 29, No 11, p 937-941, November 1974. 3 fig, 20 ref. English summary.

Descriptors: *Sewage treatment, *Treatment facilities, Urban areas, Management, Computers, *Control system, Pumps, *Waste water treatment.
Identifiers: *Japan.

Management and control of sewage treatment plants are becoming necessary with an increased amount of construction to cope with pollution of rivers adjacent to large cities. The control system of the Totsuka-Daini Sewage Treatment Plant in Japan is described. It features the collective automatic management of multiple sewage treatment plants in block, the automatic operation of waste and storm sewage pumps by means of the computer CLEARAC, the separation of pumping rooms, and a tele-control system which connects these pumping rooms to a central control for supervisory control. In addition, contacts in the sequence circuit are eliminated, and sequence change is accomplished by the use of the computer PROSEC. Automatic and interlocked operation of individual treatment plants is practiced in addition to the centralized supervisory control of the overall plant. (Prague-FIRL)
W75-08880

EXPANDING CLEVELAND'S SOUTHERLY WASTEWATER TREATMENT PLANT.
Water and Sewage Works, Vol 121, No 11, p 86-88, November 1974. 3 fig, 5 tab.

Descriptors: *Waste water treatment, *Treatment facilities, Design criteria, *Sewage treatment, Municipal wastes, Sludge, Biological treatment, Waste disposal, *Ohio.
Identifiers: Cleveland(Ohio).

The city of Cleveland, Ohio has three waste water treatment plants; of these, the Southerly plant has not met water quality standards. The City of Cleveland, the United States Environmental Protection Agency, and the state of Ohio are now working on the design of systems to solve three problems: to eliminate discharges of untreated industrial wastes; to minimize combined sewer discharge effects; and to upgrade the level of treatment at the Southerly Wastewater Treatment Center. The basis of a new design was that all flow to the plant up to 400 mgd be given complete treatment and that all flows in excess of 400 mgd up to 735 mgd be given the equivalent of primary treatment and disinfection with provisions available for the addition of organic and/or inorganic flocculants. A treatment system has been selected consisting of primary sedimentation, two-stage activated sludge system, and effluent polishing by filtration and disinfection. A wet-stream process system requires the construction of additional headworks, screening and grit removal facilities, additional primary treatment facilities, modification of an existing aeration system, construction of additional first-stage clarifiers, construction of effluent filtration and disinfection systems. Sludge handling consists of degritting and thickening of the sludges; storage; dewatering; and incineration. An on-site disposal system is presently used, but future land disposal is also feasible. (Prague-FIRL)
W75-08882

WHEN TO USE CONTINUOUS FILTRATION HARDWARE,
Envirotech Corp., Salt Lake City, Utah.
R. C. Emmett, and C. E. Silverblatt.
Chemical Engineering Progress, Vol 70, No 12, p 38-42, December 1974. 3 fig, 1 tab, 7 ref.

Descriptors: *Filtration, *Equipment, *Waste water treatment, Slurries, Sludge, Capital costs, Operating costs, Construction, *Filters.

Selection of the proper filtration equipment for a particular application requires guidelines. Detailed are the types of slurries that can be handled by continuous filtration, the factors that must be considered in a flowsheets, and the costs and benefits involved. Feed slurry properties include: suspended solids concentration, particle size distribution, system composition, liquid viscosity, liquid volatility, degree of liquid saturation, temperature, special properties of solids or liquid, required materials of construction, and feed rate. Filtration requirements analysis should consider several facets of operation. One can never obtain a high filtration rate, an absolutely clear filtrate, a completely washed cake, and an extremely low residual cake liquor content. Requirements should include minimum performance which can be reasonably tolerated and take capital and operating costs into account. These requirements include: filtrate clarity, cake washing, cake moisture, filtrate dilution, end use of solids, capital limitation, total process flowsheet, product value and in-process inventory, chemical conditioning, and pretreatment of slurry. Bench scale testing begins with choice of a filter medium and should be designed to determine the rate of its operations as applied to possible type of continuous filtration equipment. In considering the available solid-liquid separation methods, economics should be the final decision, with flexibility and dependibility for a practical system. (Prague-FIRL)
W75-08883

DETERMINATION OF HEAVY METALS IN MUNICIPAL SEWAGE PLANT SLUDGES BY NEUTRON ACTIVATION ANALYSIS,
North Carolina State Univ., Raleigh. Nuclear Services Lab.
For primary bibliographic entry see Field 5A.
W75-08891

FIELD TESTING OF CENTRIFUGAL WASTEWATER PUMPS,
Clinton Bogert Associates, Fort Lee, N.J.
P. E. Cardillo, and W. Eakins.
Public Works, Vol 105, No 12, p 55-57, December, 1974. 2 fig, 2 tab.

Descriptors: *Pumps, *Waste water treatment, *On-site tests, *Centrifugal pumps, Equipment, Pumping.

The preparation and procedures for testing centrifugal waste water pumps at the site of installation are described. Field performance of the pumps must be made by qualified personnel and in accordance with the test code of the Hydraulic Institute Standards. Variations should be expected between field test results and the manufacturer's shop test results because of the conditions of instrumentation and the degree of accuracy. Troubles which may occur with the pump and their probable causes are outlined; problems include failure of the pump to deliver liquid, insufficient capacity, insufficient discharge pressure, pump overloading driver, pump vibrating, and noise in the pump. Preparation for testing involves checking the alignment of the pump and driver, checking the motor rotor for binding, and priming the pump. Instruments such as the pressure gauges, rpm counter, and watt-megger should be calibrated for accuracy. In the actual field test of the pump, it should be started with a closed discharge valve; then the valve should be slowly opened. Observations of proper stuffing box location, noises in pump or motor, vibrations in the pump, motor, or piping, and leaks in piping should be made. Readings should then be taken of vertical distance between suction and discharge gauges, suction gauge reading, discharge gauge reading, flow, and the power input to the motor measured at the motor. A standard for this entitled 'Centrifugal Pumps Test Code' is available from the Hydraulic Institute to record data for each pump tested. (Prague-FIRL)
W75-08892

F2 COLIPHAGE AS TRACER IN WASTEWATER BASIN,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Health.
K. Kawata, and V. P. Olivieri.
Journal of the Environmental Engineering Division, Procedings of ASCE, Vol 100, No EE6, p 1307-1310, December, 1974. 1 fig, 6 ref.

Descriptors: *Tracers, *Waste water treatment, Basins, Sedimentation basins(Waste disposal), Municipal wastes, Viruses, *Bioindicatiors, Pollutant identification.
Identifiers: *f2 Coliphage, Biological tracers.

Various types of chemical tracers have been used to determine actual rather than theoretical flow-through times in sedimentation basins for waste water treatment. As an alternative, the use of the biological tracer, f2 coliphage was investigated. This virus is often used as a model virus and can be grown in the laboratory with little difficulties to very high concentrations. Its assay is relatively uncomplicated, and there are normally very few male strains of the host of this virus to be found in community waste water. It was concluded that f2 is a suitable tracer to determine virus flow-through in a basin. When virus study was conducted in waste water unit processes, the use of the f2 coliphage for determination of flow-through time was convenient and gave little difficulty. (Prague-FIRL)
W75-08893

FILM TRANSPORT COEFFICIENT IN AGITATED SUSPENSIONS OF ACTIVATED CARBON,
Northwestern Univ., Evanston, Ill. Environmental Health Engineering.
R. D. Letterman, J. E. Quon, and R. S. Gemmell.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2536-2546, November, 1974. 7 fig, 2 tab, 13 ref.

Descriptors: *Activated carbon, *Adsorption, *Phenols, Organic compounds, Kinetics, Mathematical studies, *Waste water treatment, Waste disposal.
Identifiers: *Film transport coefficient.

Adsorption equilibrium and kinetics must be understood for effective application of the activated carbon process for the removal of dissolved organic substances from water and waste water. The rate of uptake of phenol from dilute aqueous solutions by activated carbon particles was studied by using an agitated batch system. The effects of the initial phenol concentration and particle size on the uptake rate when extra-particle resistance to mass transfer is controlling were noted. Film transport coefficients were determined. The uptake of phenol may be described by the dimensionless expressions of either the Gilliland-Sherwook or the Froessling type. The film transport coefficient and its relationship to variables in the system, when it is correlated by the use of the Sherwood, Schmidt, and the specific power numbers was found to be independent of vessel geometry, impeller geometry, and impeller rotational speed. For the phenol carbon system, the film transport coefficient was shown to vary with the specific power input to the 0.149 power and with the particle diameter to the -0.348 power. (Prague-FIRL)
W75-08895

INSTRUMENTATION FOR FILTRATION TESTS,
Coulter Electronics, Inc., Hialeah, Fla.
For primary bibliographic entry see Field 5A.
W75-08897

DETERMINATION OF CHLORINE-CONTAINING ORGANICS IN CHLORINATED SEWAGE EFFLUENTS BY COUPLED 36CL TRACER--HIGH RESOLUTION CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-08898

ALGAE REMOVAL BY CHEMICAL COAGULATION,
M. A. Al-Layla, and E. J. Middlebrooks.
Water and Sewage Works, Vol 121, No 9, p 76-80, September, 1974. 9 fig, 2 tab, 12 ref.

Descriptors: *Algae, Surface waters, *Water purification, *Temperature, Regression analysis, Mathematical models, *Coagulation, Alum, Flocculation, Settling, *Waste water treatment, Nutrient removal.
Identifiers: Analysis of variance, Algal coagulation, *Algal removal, Chemical coagulation.

Algae in surface waters and waste water stabilization pond effluents cause problems such as the shortening of filter runs in water purification plants, and clogging of distribution pipes and other water conduits. During the warm seasons, waste water stabilization pond effluents contain particularly high concentrations of algal cells which are discharged to a watercourse. These algae necessitate further treatment to meet newly legislated effluent guidelines. As a method of algal removal prior to discharge, chemical coagulation is proposed. This study investigated the effect of temperature on algal cell coagulation a variable which had not been previously analyzed. Interactions between five independent variables--temperature, alum dosage, mixed speed, flocculation time, and settling time--were mathematically studied. In an analysis of variance test, the most significant variable was alum dosage, followed by temperature, then flocculation time, paddle (mixing) speed, and settling time. Step-wise multiple regression analysis indicated the relationship between the percentage removal of algae and the other independent variables; a linear mathematical model was the most successful. Additional factors that might account for the effect of temperature on algae coagulation include the hydrophilic characteristics of algal colloidal material. (Prague-FIRL)
W75-08900

BOUNDARY LAYER SEPARATION CONCEPT OF SETTLING TANKS,
George Washington Univ., Washington, D.C. Dept. of Civil, Mechanical and Environmental Engineering.
Y. Chiu.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol 100, No EE6, p 1213-1218, December, 1974. 1 fig, 2 ref.

Descriptors: *Separation techniques, *Sedimentation, Mathematical models, Solids, Settling basins, *Waste water treatment.
Identifiers: Circular tanks, Rectangular tanks, *Settling tanks.

An investigation of the inefficiency in sedimentation of using a circular tank as compared with a rectangular sedimentation tank was conducted. Theoretical flow characteristics of each type of settling tank were determined mathematically. Because of convenience of operation and other factors, more circular tanks than rectangular tanks have recently been used. However, it was demonstrated that separation will occur in the conventional horizontal-flow central-feed circular tank, but not in the rectangular tank. This separation

results in eddy currents which reduce the efficiency in removal of settleable solids. The theoretical model for this type of circular tank showed that the liquid surface rises in its flow direction, and causes unstable flow, resulting in poor sedimentation. (Prague-FIRL)
W75-08901

METHOD OF PROCESSING SEWAGE,
W. Thorn.
Canadian Patent 957,443. Issued November 5, 1974. Patent Office Record, Vol 102, No 45, p 45, November, 1974.

Descriptors: *Patents, *Sludge treatment, *Dehydration, Hydrogen ion concentration, Chemical precipitation, *Waste water treatment.
Identifiers: Acidification, Filter press.

A new method of treating sludge is described. The sludge is acidified with a mineral acid to a pH value just below 5; the pH value is then adjusted to the isoelectrical range of the high molecular sludge substances by the addition of hydrochloric acid. Floated hydrophobic substances are removed from the surface and the precipitated sludge is moved with calcium hydroxide or calcium and dehydrated in a filter press to a water content of 30 to 50 percent by weight. This process is less expensive than conventional processes and allows faster sludge dehydration. (Prague-FIRL)
W75-08903

STUDY OF THE EFFECTIVENESS OF WATER TREATMENT PLANTS IN REMOVING BENZO(A)PYRENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
K. P. Ershova, and L. S. Kanunnikova.
Gig Sanit, Vol 38, No 9, p 89-90, 1973.

Descriptors: *Water treatment, *Sedimentation, *Coagulation, *Filtration, *Chlorination, *Organic compounds, Pollutants, Water pollution sources, Separation techniques.
Identifiers: Carcinogens, *Benzo pyrene, Effectiveness.

A study of the effectiveness of 5 water treatment plants using sedimentation, coagulation, filtration, and chlorination showed that with respect to removing benzo(a)pyrene, effectiveness of treatment ranged within wide limits, from 20-92%. The treated water contained this carcinogen in a concentration raching 0.002 microgram/liter. Since treatment plants cannot remove the carcinogen completely from the water, sanitary measures should be aimed at protecting the supply bodies of water against contamination by carcinogenic hydrocarbons.--Copyright 1975, Biological Abstracts, Inc.
W75-08924

FEED FORWARD CONTROL OF AN ACTIVATED SLUDGE PROCESS,
Kentucky Univ., Lexington. Dept. of Chemical Engineering.
R. W. Brett, R. I. Kermode, and B. G. Borrus.
Water Research, Vol 7, No 4, p 525-535, April, 1973. 6 fig, 2 tab, 5 ref. OWRR A-040-KY(2), 14-31-0001-3517, 14-31-0001-3817.

Descriptors: *Activated sludge, Computer models, Simulation analysis, *Flow rates, Return flow, Operations, Control systems, *Waste water treatment, Aeration.
Identifiers: Aeration tanks.

The control of an activated sludge process is an inherently difficult problem. The non-linearty of the process, the wide range of operating conditions, and the lack of a really suitable control variable all contribute to this difficulty. A computer simulation on a perfectly mixed aeration tank was used to show that feed forward control is the most suitable control method for a wide range of operating conditions. In particular, proportional control with measurement of the substrate flow rate and manipulation of the rate of return sludge was an effective as much more complex combinations of feed forward and feed back controllers. There was some indication that on-off control would be highly effective. (Huffsey-Kentucky)
W75-08931

REMOVAL OF PESTICIDES FROM WATER BY VARIOUS WATER TREATMENT METHODS, (IN RUSSIAN),
K. K. Vrochinskii.
Gig Sanit, Vol 38, No 11, p 76-78, 1973.

Descriptors: *Reviews, *Water treatment, Coagulation, Sedimentation, Filtration, Chlorination, Separation techniques, Pollutants, *Pesticides, Water pollution sources, DDT, Waste water treatment.
Identifiers: Adsorbents, BHC Methyl, Oxidizing agents, Parathion, Phosphamide.

A review of the literature established that the conventional methods of water treatment-coagulation, sedimentation, filtration and chlorination-did not remove pesticides from water or reduce their quantity significantly. The exception was DDT. Removal of pesticides from water generally required special methods of treatment with the use of oxidizing agents (ozone, K permanganate, etc.) or adsorbents (activated C, etc.). Intermediate substances more toxic than the initial substances (parathion, phosphamide) or substances adversely affecting the organoleptic properties of water (Malathion, methyl parathion, hexachlorocyclohexane) can form in the case of small doses of oxidizing agents.--Copyright 1975, Biological Abstracts, Inc.
W75-08933

LIVESTOCK AND THE ENVIRONMENT: A BIBLIOGRAPHY WITH ABSTRACTS, VOLUME II,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 5G.
W75-08937

IRRIGATION WITH WASTE WATER AT BOARD OF WORKS FARM, WERRIBEE,
Melbourne and Metropolitan Board of Works (Australia).
C. F. Kirby.
Paper presented at Water Research Foundation Sumposium, August, 1967, 5 p.

Descriptors: *Waste water disposal, *Watste water treatment, *Irrigation practices, *Australia, *Livestock, Irrigation water, Range grasses, Soils, Drainage, Channels, Sedimentation, Oxidation, Farm wastes.

Near the end of the 19th century, the Australian government established a Board of Works farm outside the city of Melbourne of utilize treated human and industrial waste carried by a waterborne waste disposal system for irrigation of the prepared land. A study of this land some 70 years later shows that farm pastures are in good condition, the grazing livestock healthy, and the 170 people residing on the farm enjoying normal health and freedom from disease. Other than aesthetic ones, results show no reason why present irrigation methods cannot continue with a greater portion of the city waste water being put to similar productive use. With suitable treatment this water could also by used for more valuable crops where first-use water becomes inadequate. (Mastic-Arizona)
W75-08941

EVALUATION OF POTENTIAL SPACECRAFT WASH WATER PRETREATMENT SYSTEMS,
Abcor, Inc., Cambridge, Mass. Walden Research Div.
D. C. Grant, A. Gollan, and R. L. Goldsmith.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 984, $5.25 in paper copy, $2.25 in microfiche. OWRT Report INT-OSW-RDPR-75-1005, June 1975. 91 p, 30 fig, 12 tab, 14 ref, 4 append. 14-30-3275.

Descriptors: *Waste water treatment, *Reverse osmosis, *Water purification, *Membranes, *Filtration, Adsorption, Filters.
Identifiers: *Carbon adsorption, Glass fiber filtration, Spacecraft wash water recycle system, Depth filters, Cellulose acetate, *Ultrafiltration, Sand filtration.

The studies evaluated several treatment processes for use in the purification of recycle wash waters generated aboard spacecrafts. The unit processes investigated included: regenerable filtration, ultrafiltration, regenerable sand depth filtration, regenerable glass fiber depth filtration, carbon adsorption and reverse osmosis. The regenerable filtration studies have shown that ultrafiltration is far superior to the other filtration methods investigated from all aspects. Superiority was demonstrated in product water quality, system compactness, reliability, maintainability and safety.
W75-09050

A STUDY OF THE REMOVAL OF PESTICIDES FROM WATER,
Kentucky Water Resources Inst., Lexington.
J. D. Whitehouse.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-242 971, $7.00 in paper copy, $2.25 in microfiche. Research Report No 8, 1967. 175 p, 64 fig, 5 tab, 51 ref. OWRR A-002-KY(3). 14-01-0001-911.

Descriptors: *Pesticide removal, *Pesticides, Water treatment, *Aeration, Adsorption, Form separation, *Waste water treatment, Pesticide residues, *Activated carbon, Clays, DDT, Coagulation, 2,4-D, Aldrin, Dieldrin, 2,4,5-T.
Identifiers: Chemical coagulation, Malathion, Captan, Benzene haxachloride.

The purpose was to investigate some of the properties of pesticides as they exist in water, and to determine the effectiveness of several water treatment processes in the removal of pesticides from water. Among the pesticides investigated were malathion, DDT, aldrin, dieldrin, captan, benzene hexachloride (BHC), 2,4-D, and 2,4,5-T. The water treatment processes include aeration, chemical coagulation, adsorption on activated carbons and clays, and foam separation. The removal of pesticides from water by aeration was significant. Dieldrin was removed almost 100 percent, while aldrin, DDT, and BHC were removed to a lesser extent. There was no loss of 2,4,5-T and captan through aeration. Chemical coagulation alone was ineffective in the removal of pesticides from water. Several coagulant aids were investigated but all proved ineffective with the possible exception of one which increased the apparent removal slightly. Of the processes investigated adsorption with activated carbon was the most effective in removing pesticides from water. The removals obtained were--malathion near 100 percent; 2,4-D, 90 percent; DDT, 95 percent; aldrin, 100 percent; dieldrin 90 percent. (Huffsey-Kentucky)
W75-09052

RANDOM PLASTICS MEDIA ARE KEY TO HIGH-QUALITY EFFLUENT,
I. Rodgers.
Process Engineering, p 68-69, August, 1974. 2 ref.

Descriptors: *Plastics, *Filters, Effluents, *Biological treatment, Costs, Materials, Filtering systems, Electric power costs, *Waste water treatment, *Filtration.
Identifiers: Flocor RC, Random plastic media, Polyvinyl chloride, Stone media(Filtering), Plastic filters.

The use of random media for filtering both domestic and industrial effluents has been applied to biological effluent treatment. In the past, stone filters were the only type used. Recently however, the use of plastics as percolating filters has been investigated. The major problem, which was overcome, was to devise a shape with the highest surface possible, consistent with the requirements of adequate void space and resistance to compression. The necessary plastic media has to give a surface three times that of stone, or 300 sq m/cu m, in order to be economical. One such product derived from PVC is Flocor RC, developed by ICI. It is tubular in shape with corrugations running around the circumference. The material is inert and highly resistant to chemical, biological, and photochemical degradation. PVC also has strength of compression. New random plastic filters may be used in older systems to replace stone filters, thus relieving hydraulic and organic overload. They may also be used in new installations. Flocor RC filters have two advantages: they are light in weight--one seventh that of stone media--and thereby require lower-cost structures; and percolating filters have negligible power cost, representing another savings. (Prague-FIRL)
W75-09060

CONTROLS DRY UP WET WEATHER POLLUTION,
Metcalf and Eddy, Inc., Mass.
J. A. Lager.
Water and Wastes Engineering, Vol 11, No 9, p 35-37, September 1974. 2 fig.

Descriptors: *Storm runoff, *Combined sewers, *Waste water treatment, *Storm water, Cities, Water storage, Storm drains, Pollution control, Pollution abatement, Equipment, Conduits, Sanitary engineering, Treatment facilities.

One of the most challenging tests of sanitary engineering skills is the development of methods for wet weather pollution control and abatement. System control and storage with feedback to existing plants, independent facilities and modified existing plants have been developed to meet these problems. The goal of system control is to optimize the containment and treatment of storm runoff. The actions taken are dependent upon the storm pattern, treatment and storage availability, and projected storm and system behavior. Mathematical models can be an important asset in the development and fine-tuning of these systems. Storage is one of the most cost-effective tools for the reduction of pollution resulting from combined sewage overflow. Storage can be in-line damming, gating or otherwise restricting the flow passage in combined sewers that are designed to carry maximum flows that might occur once every five years. Storage can be offline through the use of basins, controlled ponding, tunnels, and silos. The total systems approach may be impractical in some situations; immediate solutions may then be relatively limited purpose, independent facilities which will either be integrated or made obsolete by future construction. Examples of these facilities include: fine screening; microstraining; swirl concentrating; dissolved air flotation; physical-chemical treatment; and, disinfection. The storm runoff treatment processes of many United States cities are described. (Orr-FIRL)
W75-09061

PRESSURE FILTER FOR WATER TREATMENT - FROM PRE-STRESSED CONCRETE RINGS WITH INTEGRAL FILTER PLANTS.
German Patent 74441V/43. Issued October 17, 1974. Derwent German Patents Report, Vol 5, No 43, p 1, December 3, 1974.

Descriptors: *Patents, *Filters, Concrete, Construction materials, Pressure, Water treatment, Filtration.
Identifiers: Concrete rings, Pressure filters.

A pressure filter for water treatment was designed from pre-stressed concrete rings with integral filter plates. A closed horizontal pressure vessel with filter plates, fitted with filter nozzles, consists of a series of adjacently situated pre-stressed concrete rings with two end closures. These are clamped together by tensioning members running along inside the wall of the vessel. The concrete rings have parallel vertial side walls and curved arcuate upper and lower wall parts, with at least two integrally-formed filter plates extending over the full width of the ring between the parallel side walls. (Prague-FIRL)
W75-09062

SMALL-SCALE SEWAGE TREATMENT PLANT-WITH DETACHABLE AERATION AND ACTIVATED SLUDGE RECYCLING FITMENTS.
German Patent 63255V/36. Issued August 29, 1974. Derwent German Patents Report, Vol 5, No 36, p 3, October 15, 1974.

Descriptors: *Patents, *Sewage treatment, *Activated sludge, *Aeration, Recycling, Clarification, Treatment facilities, Biological treatment, *Waste water treatment, *Treatment facilities.

A small-scale sewage treatment plant with detachable aeration and activated sludge recycling fittings is described. It consists of an inner tank, which acts as the final clarification basin, and an annular space surrounding it. This space is divided by segments into two mechanical precleaning chambers in series and one chamber which can be converted into an activated basin by an aeration device. An activated sludge discharge pipe and an activated sludge recycling arrangement can be readily removed or inserted from the third chamber. The plant can cope with widely fluctuating input rates and can be operated as an activated sludge plant for mechanical-biological clarification. It can also be utilized as a mechanical settling basin with good clarification efficiency. (Prague-FIRL)
W75-09063

REMOVAL AND RESUSPENSION PROCESSES - DRY DEPOSITION OF PARTICLES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09074

SPECIAL STUDIES - COOLING TOWER RESEARCH - BIOMETEOROLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-09076

OPTIMAL RISK-BASED DESIGN OF STORM SEWER NETWORKS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
W. H. Tang, L. W. Mays, and B. C. Yen.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 101, No EE3, Proceedings paper No. 11360, p 381-398, June 1975. 7 fig, 3 tab, 14 ref. OWRT C-4123(No 9023)(2).

Descriptors: *Dynamic programming, *Environmental engineering, *Risks, *Sewers, Networks, Design, Probability, Costs, Drainage, Optimization, Sanitary engineering, Evaluation, Safety factors, Hydraulic models, Flooding, Constraints, Computers, Damages, Methodology, Equations, Mathematical models, Systems analysis.
Identifiers: *Economic analysis, *Storm sewers, Uncertainty principle, Cost minimization.

Rapid population growth is causing severe problems in urban storm sewer management. Despite this situation, existing design methods fail both to account explicitly for the cost interaction of the various components of sewer systems and to consider systematically the uncertainties that are unavoidable in sewer network design, such as precipitation rate, insufficient data, and errors in design equations. Presented is a least-cost, optimization method for the design of storm sewersystems that considers risk due to uncertainties in the design parameters. The optimal choice of slopes and diameters of the entire sewer network is based on a tradeoff between risk due to potential flood losses and the cost of installation of the sewers. Two models, ranging in the degree of sophistication, are suggested to account for the costs of expected flood damages. These are incorporated into a dynamic programming solution procedure; discrete differential dynamic programming is successfully applied to make the design optimization procedure of a large storm sewer network become feasible by significantly reducing the computer time and storage involved. This method provides a rational yet practical approach to design storm sewer systems, particularly when considerable flood damages are expected or when differential damage costs will be incurred between regions of the same storm sewer system. (Bell-Cornell)
W75-09082

ENVIRONMENTAL SYSTEMS APPRAISALS AND DEVELOPMENT GUIDES.
Harza Engineering Co., Chicago, Ill.
Prepared for Rock Valley Metropolitan Council, Rockford, Illinois, December, 1973. 226 p, 23 fig, 25 tab, 140 ref, 6 append.

Descriptors: *Regional development, *Water supply development, *Waste water disposal, *Regional analysis, Water treatment, Water quality control, *Waste water treatment, Environmental sanitation, *Illinois, Landfills, Septic tanks, Storm runoff, Air pollution, *Wisconsin, River basin development.
Identifiers: *Rock Creek Metropolitan Council(Ill-Wis), Open space development, *Rock River basin(Ill-Wis).

Rock Valley Metropolitan Council (RVMC) serves 3 counties in the Rock River Basin--Winnebago and Boone in Illinois, and Rock County, Wisconsin. These regional guides for water supply, sewerage and open space, and appraisals of storm drain, solid waste, and air pollution control systems were done for RVMC. Water Supply: 72% of the region is served by central supply systems which are generally adequate but lack sufficient storage capacity. The other 18% is served by private systems, some of which are threatened by septic tank sewage disposal and/or poorly constructed or located wells. Sanitary Sewage: Four priority categories are defined. The immediate need is to eliminate health hazards. First priority is to provide sewage collection and treatment for areas currently served by septic tanks. Second priority is expansion of present treatment capacities where needed. Third priority is expansion for future needs. Fourth priority areas show no apparent need up to the year 2000. Open Space: Land should be acquired to preserve the form of the urban areas and for aesthetic, recreation, or wildlife qualities. Air Pollution and Storm Drain Appraisals show no serious present problem. Solid Waste: New and better-managed landfill sites are

needed immediately to prevent further contamination of water supplies. (Herr-North Carolina)
W75-09107

RECLAMATION OF ANTHRACITE COAL REFUSE USING TREATED MUNICIPAL WASTEWATER AND SLUDGE,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sopper, L. T. Kardos, and L. E. DiLissio.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-243 114, $7.00 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Completion Report, April 1975. 168 p, 62 tab, 21 fig, 67 ref, 1 append. OWRT B-069-PA(1), 14-31-0001-4122.

Descriptors: *Sewage effluents, *Sewage disposal, *Revegetation, *Sewage sludge, Municipal wastes, Calcium, Phosphorus, Nitrogen, Legumes, Grasses, Trees, Pennsylvania, *Coal mine wastes, Coals, Lysimeters, Reclamation, Land reclamation, Feasibility studies.
Identifiers: *Liquid digested sludge, *Anthracite mining refuse, Tension lysimeters, Ground cover.

The study determined the feasibility of using municipal sewage effluent and liquid digested sludge to facilitate the revegetation of anthracite mining refuse. Four boxes, 4 x 32 x 4 feet deep, were filled with anthracite coal refuse from a mining operation. The refuse was planted with eight species of trees, and seeded with eight species of both grasses and legumes. The boxes were then treated with sewage effluent and liquid digested sludge. Weekly percolate samples were collected at the 6 inch and 42 inch refuse depths with tension lysimeters. Treatments were applied for 19 weeks. Most tree species showed a significant response to treatment. The application of sludge appears to be necessary for successful establishment of a dense ground cover. Maximum grass and legume dry matter productions and percent areal covers were observed. Chemical analyses of the grasses revealed an increase in the content of nitrogen, phosphorus and calcium with each increase in fertilizer value of treatment. Application of treated domestic sewage increased the pH of the coal refuse at each level of treatment. Results indicate that revegetation of anthracite coal refuse is possible through the application of treated municipal wastewater. (Sink-Penn State)
W75-09131

TOXICITY OF KRAFT MILL WASTES TO AN ESTUARINE PHYTOPLANKTER,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09159

HYDRAULIC CHARACTERISTICS AND WATER-SUPPLY POTENTIAL OF THE AQUIFERS IN THE VICINITY OF THE WASTE-WATER TREATMENT PLANT, SOUTH BEND, INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4B.
W75-09179

A MATHEMATICAL MODEL OF URBAN STORM DRAINAGE,
Water Resources Engineers, Inc., Walnut Creek, Calif.
R. P. Shubinski, and L. A. Rosener.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 379-406, 13 fig, 14 ref. FWQA Contracts 14-12-501, 14-12-502, 14-12-503.

Descriptors: *Urban hydrology, *Drainage systems, *Storm water, *Mathematical models, *Storm runoff, Urban drainage, Urban runoff, Water quality, Design, Rainfall-runoff relationships, Hydrologic systems, Hydrology, Routing, Management, Water pollution treatment, Optimization, Systems analysis, Computer models, Watersheds(Basins), Model studies.

A stormwater model under development was described. The model is capable of representing urban runoff phenomena, both quantity and quality, from the onset of precipitation on the basin through collection, conveyance, storage, and treatment systems to points downstream from outfalls which are significantly affected by storm discharges. Each of the three parts, urban runoff, storm water transport, and receiving water, were described and the composite model was demonstrated on four basins. (See also W75-09210) (Terstriep-ISWS)
W75-09225

STRIP-MINED LAND RECLAMATION WITH SEWAGE SLUDGE: AN ECONOMIC SIMULATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
W. D. Seitz.
American Journal of Agricultural Economics, Vol 56, No 4, p 799-804, November 1974. 1 fig, 1 tab, 14 ref. OWRT A-061-ILL(2). 14-31-0001-3813.

Descriptors: *Reclamation, Sewage sludge, Economics, *Illinois, *Simulation analysis, *Land reclamation, Mine wastes, Cost analysis, Performance, *Recycling, Waste treatment.
Identifiers: *Chicago(Ill).

The economic aspects of a land reclamation, sludge utilization project being operated by the Metropolitan Sanitary District of Greater Chicago are simulated. The variables influencing performance most were sludge transport costs, site preparation costs, the nitrogen budget, cropping system, and source of labor in site preparation.
W75-09236

CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATION GUIDELINES, STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09250

TEXTILE INDUSTRY POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09251

WATER POLLUTION CONTROL--CONSTRUCTION GRANTS FOR WASTE TREATMENT WORKS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 29, Part III, p 5252-5270, February 11, 1974.

Descriptors: *Construction, *Grants, *Administrative agencies, *Environmental control, *Waste treatment, Water pollution control, Government finance, Contracts, Projects, Research and development, Federal government, Environment, Environmental engineering, Environmental effects, Environmental sanitation, Waste water(Pollution), Waste water(Treatment), Wastes, Water pollution, Legislation, Projects.
Identifiers: Administrative regulations, FWPCA Amendments of 1972, Environmental policy, Hazardous substances(Pollution).

Tital II of the Federal Water Pollution Control Act Amendments of 1972 authorizes the award of construction grants for waste treatment works. This regulation attempts to conform the procedures and requirements of the new grant system to the construction grants program established under section eight of the prior Federal Water Pollution Control Act, as well as to ensure that new statutory requirements will be met. The three-step grant process provides that a basic grant application is submitted for the initial award of grant assistance, and that subsequent related projects will be funded through amendment of this grant. Section 35.915 has been revised and expanded to explain more clearly Environmental Protection Agency requirements under applicable statutory provisions for state priority systems. Facilities planning requirements are set forth and new procedures have been established to assure that the infiltration/inflow requirements are met without unnecessary documentation and expense. New provisions state the Agency's position with respect to the initiation of project construction, and a considerable number of technical revisions have been made throughout. (Fernandez-Florida)
W75-09256

A PROPOSED METHOD OF WASTE MANAGEMENT IN CLOSED-CYCLE MARICULTURE SYSTEMS THROUGH FOAM-FRACTIONATION AND CHLORINATION,
Delaware Univ., Newark. Dept. of Agricultural Engineering.
R. C. Dwivedy.
In: 1973 Proceedings of the National Shellfish Association. Vol 64, p 111-117, 1974. 4 fig, 1 tab, ref. Report DEL-SG-8-75.

Descriptors: *Waste treatment, *Aquaculture, *Foam fractionation, *Chlorination, Filtration, Carbon filters, Animal wastes(Wildlife), Ammonia, Marine biology, Biochemistry, Waste water treatment.
Identifiers: *Closed-cycle mariculture systems, Bacterial filters, Non-bacterial filters, Biological filters.

A scheme of waste management independent of bacterial filters in closed-cycle mariculture systems was presented. Foam-fraction was recommended for organic removal to prevent build-up of high ammonia levels in the system. Breakpoint chlorination was recommended for the removal of remaining low levels of ammonia. Dechlorination was achieved through carbon filtration. An algal production system can easily be coupled in the system if mollusks are to be cultured. Non-bacterial filters remove contaminant more rapidly and completely and are not limited by disadvantages associated with bacterial filters, such as excessive space requirements and build-up of high nitrate in the system. (NOAA)
W75-09279

DECENTRALIZED WATER REUSE SYSTEMS IN A WATER SCARCE ENVIRONMENT: THE TOURIST INDUSTRY IN ST. THOMAS, VIRGIN ISLANDS,
Clark Univ., Worcester, Mass.
R. E. Kasperson, C. Schepart, J. Sorensen, and R. Simpson.
Government of the Virgin Islands, Department of Health, Division of Environmental Health, Water Pollution Report No 13, commissioned by Caribbean Research Institute, College of the Virgin Islands. May 1971. 39 p, 9 fig, 7 ref, 1 append.

Descriptors: *Water reuse, *Reclaimed water, *Water supply development, *Virgin Islands, Salvage value, Water costs, Supply development, Consumptive use, Dependable supply, Storage requirements, Impaired water use, Irrigation

water, Cisterns, *Water treatment, Waste water treatment, Desalination, Potable water.
Identifiers: Dual water supply systems, Charlotte Amalie, St. Thomas(Virgin Islands).

Substantial economic savings appear possible through water reclamation and reuse on St. Thomas, Virgin Islands, at least for high volume tourist industry users remote from the municipal system at Charlotte Amalie. This system, faced with unreliable rainfall and rapidly growing demand for potable water, has added three desalinization plants to provide the needed supply. Remote resorts on the island also have used rainwater collected from roof runoff and large catchment structures, stored in cisterns with total capacity up to 1,205,000 gallons at one large resort. Unreliable rainfall and high per capita use have led to supply augmentation, primarily by trucking in water from Charlotte Amalie. Costs can be up to ten times the cost in the city, depending on distance. Use of high cost water is lessened with dual supply systems which use water of impaired quality for flushing and irrigation (up to 50% of demand). Guests are not often asked to conserve water. Poor soils and irregular terrain make the 1250 septic tanks at various facilities costly to operate. Development has tended toward package plants. Cost of package plant treatment with dual water supply system using reclaimed water for irrigation is compared to the present combination of less expensive septic tank disposal combined with more expensive water supply. Decentralized integrated reuse systems are less expensive. (Herr-North Carolina)
W75-09297

REMOVAL OF PHOSPHATE FROM WATER BY ALUMINUM,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
W. L. Yuan.
PhD Thesis, January 1972, 79 p. 8 fig, 14 tab, 34 ref. OWRT A-031-NJ(5). 14-31-0001-3530.

Descriptors: Phosphates, *Waste water treatment, *Nutrient removal, *Aluminum, Chemical precipitation, *Coagulation, Anions, Chemical reactions.
Identifiers: Reactants mixing, *Phosphate removal.

Two factors governing the effectiveness of aluminum to precipitate phosphate from solution were investigated: (1) Effect of foreign components: The effectiveness of OH-Al polymers to precipitate phosphate was greatly influenced by the ratio of phosphate to aluminum and also by the nature and concentration of foreign components present. In the presence of sulfate, montmorillonite or kaolinite, phosphate removal was greatly improved. Also, the dosage of coagulant and the acidity did not need critical control in order to attain the optimum phosphate removal. Some anions, such as F-, however, had serious detrimental effects. (2) Effect of the order of reactants mixing: A change in the order of reactants mixing resulted in a different degree of phosphate removal in many cases, evidently due to the lack of equilibrium. Little change toward equilibrium state occurred during aging up to at least two years when the experimentation was terminated. (Hsu-Rutgers)
W75-09298

RECIRCULATING SEWERAGE SYSTEM,
Koehler-Dayton, Inc., New Britain, Conn. (Assignee).
A. H. Cornish, G. W. Foster, and A. J. Campbell.
United States Patent 3,828,372. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol 925, No 2, p 353, August 1974. 1 fig.

Descriptors: *Sewage treatment, *Effluents, *Waste water treatment, *Patents, Equipment, Domestic wastes, Recycling, Water reuse.
Identifiers: *Recriculating sewerage system, Water closet.

A recirculating sewerage system consists of at least one water closet, a recirculating tank, including effluent receiving and pumping chambers divided by a common wall, and a drainage opening in the bottom of the recirculating tank. Included also was a pump with a filtering element for drawing liquid from the pumping chamber and for directing that liquid to the water closet for flushing. The separating common wall includes a filter to restrict the flow of bulk waste, such as paper products, from the chamber receiving effluent to the pumping chamber. There is also a sealing means to prevent effluent from passing from the effluent receiving chamber when a drainage value is at its first position. Both chambers are drained by the displacement of the drainage valve to its second position which allows direct passage from each of the chambers to the drainage opening. (Leibowitz-FIRL)
W75-09306

SYSTEM FOR SEPARATING HYDROCARBONS FROM WATER,
Fram Corp., East Providence, R.I. (Assignee).
For primary bibliographic entry see Field 5G.
W75-09307

SEDIMENTATION APPRATUS WITH PLURAL SLUDGE DISCHARGE FEATURE,
General Signal Corp., Rochester, N.Y. (Assignee).
E. J. Smith.
United States Patent 3,857,788. Issued December 31, 1974. Official Gazette of the United States Patent Office, Vol 929, No 5, p 2052, December 1974. 1 fig.

Descriptors: *Patents, *Sedimentation, Tanks, Sludge treatment, Waste discharge, Conduits, *Waste water treatment.

A sedimentation apparatus includes a tank having a base and an encircling side wall. It also contains means for supplying sludge-containing influent to the tank, which has a sludge hopper in its base, means for maintaining a predetermined fluid level in the tank, and means within the tank for collecting and transporting sludge settling on the base to a common location in the sludge hopper. These means include a rotary raking structure supported in the tank for rotation about the central vertical axis of the tank. Sludge pick-up means remove sludge of uniform consistency from a common location. A rotating spout, connected to the sludge pick-up means discharges sludge of uniform consistency to a place of distribution from a first and a second conduit. (Prague-FIRL)
W75-09309

EFFLUENT TREATMENT,
Cadborough Engineering Co. Ltd., Hertford (England). (Assignee).
W. E. Scragg.
United States Patent 3,817,848. Issued June 18, 1974. Official Gazette of the United States Patent Office, Vol 923, No 3, p 1064-1065, June 1974. 1 fig.

Descriptors: *Waste water treatment, *Effluents, *Activated sludge, *Patents, *Sludge removal, Water pollution, Solid wastes, Agricultural wastes, *Aeration, Screens, *Filters.

A method and apparatus to treat effluent are described. Farm effluent containing solids and fibrous matter is stored in a storage container, then passed into an aeration compartment after a portion of the treated effluent has been removed. Fibrous material with entrained activated sludge is removed by a rotary screen filter over the edge of an aeration compartment. (Leibowitz-FIRL)
W75-09310

METHOD AND APPARATUS FOR SEPARATING PARTICLES FROM A LIQUID,
E. Condolios, and U. Van Essen.
United States Patent 3,849,310. Issued November 19, 1974. Official Gazette of the United States Patent Office, Vol 928, No 3, p 1224, November, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, Liquids, Tanks, Equipment, Waste water treatment, Waste discharge.
Identifiers: Collecting tanks.

An apparatus for separating particles from a liquid consists of a basin which from top to bottom is composed of four parts, one on top of the other. These are: a cylindrical upper front part forming an overflow edge and surrounded by a discharge gutter; a downwardly diverging second part; a third part having a cylindrical section which is greater in diameter than that of the upper part, in which a screen divides the third part into a portion over and a portion under the screen, the solids being able to pass through the perforations of the screen; and, a lower part composed of several funnels, each funnel constituting a collecting tank and having a discharge outlet for particles separated from the liquid. (Prague-FIRL)
W75-09312

WASTEWATER TREATMENT UNIT,
K. L. Rost.
United States Patent 3,825,119. Issued July 23, 1974. Official Gazette of the United States Patent Office, Vol 924, No 4, p 886, July, 1974. 1 fig.

Descriptors: *Patents, *Waste water treatment, Domestic wastes, *Aeration, Water pollution, Tanks, Equipment, *Filters, *Trickling filters, Filtration.

A unit for waste water treatment with a tank to receive the waste water and a chamber above the tank is adaptable to domestic use. Within the chamber is a filter with a downwardly and inwardly tapering fabric bag holding a trickling filter body, having its bottom end open and communicating with the tank. A pump in the tank pushes the waste water through a conduit which as a distributor or diffuser above the filter body, as well as a return pipe in communication with the tank with an aspirator for returning waste water to draw air into the tank. The return pipe next to the distributor is smaller in diameter than the distributor so that pressure can build in the distributor. This forces some circulating water through lengthwise slits and into the filter with solids continuing with the rest of the water into and through the return pipe. Water which passes through the trickling filter body down to the bottom of the bag returns to the tank. Water filtered by the bag is discharged from the unit. Time control may be exercised for use in aerating the tank contents by circulation of the contents. (Leibowitz-FIRL)
W75-09313

DENSE SOLVENT DEMULSIFICATION METHOD FOR BITUMINOUS PETROLEUM WATER EMULSIONS,
Texaco Exploration Canada Ltd., Calgary (Alberta). (assignee).
D. A. Redford.
United States Patent 3,878,090. Issued April 15, 1975. Official Gazette of the United States Patent Office, Vol 933, No 3, p 1339, April, 1975.

Descriptors: *Patents, *Oily water, Emulsions, Waste water treatment, Solids contact processes, Emulsifiers.
Identifiers: Bituminous petroleum.

A process is described for resolving an emulsion of water and bituminous petroleum, the specific gravity of the bituminous petroleum being essentially the same as the specific gravity of water. The method consists of contacting the emulsion with a

treatment material which is soluble in the bituminous petroleum and essentially insoluble in water. This material is selected from the group consisting of carbon disulfide, carbon tetrachloride, chlorinated methane, chlorinated ethane, and mixtures of these. The volume ratio of treatment material to emulsion should be from about .01 to about 10.0 (Prague-FIRL)
W75-09315

TRAP TO CLEANSE OIL-POLLUTED WATER,
For primary bibliographic entry see Field 5G.
W75-09323

REMOVING ORGANIC POLLUTANTS FROM WASTE WATERS.
Netherlands Patent 56761V/32. Issued October 1, 1974. Derwent Netherlands Patents Report, Vol 5, No 42, p 2, November 26, 1974.

Descriptors: *Patents, *Waste water treatment, *Hydrocarbons, Water quality control. Organic compounds.
Identifiers: Organic pollutants.

Hydrocarbons and other organic pollutants are removed from waste waters by contacting them with a solid complex prepared by treating a solid mineral or organic support with a halogenating agent, fixing unsaturated aliphatic or aromatic amines or a protein. The resulting pre-purified liquid is mixed with a water-immiscible hydrocarbon solvent, such as a 12-18 carbon paraffin fraction. The mixture is then passed through a bed of the complex to separate the solvent containing the organic impurities. (Prague-FIRL)
W75-09324

COALESCENCE OF SMALL SUSPENDED DROPS E. G. OIL FROM WATER.
For primary bibliographic entry see Field 5G.
W75-09325

METHOD AND APPARATUS FOR FILTERING SOLIDS FROM A LIQUID EFFLUENT,
Hydro-Clear Corp., Avon Lake, Ohio. (assignee).
D. S. Ress.
United States Patent 3,817,378. Issued June 18, 1974. Official Gazette of the United States Patent Office, Vol 923, No 3, p948-949, June, 1974. 1 fig.

Descriptors: *Patents, *Effluent treatment, *Waste water treatment, *Filters, Filtration, Equipment, Effluents, Suspended solids, Water pollution treatment.
Identifiers: Backwashing.

Solids are filtered from a waste liquid using a sand filter that includes a filter tank, a layer of particulate matter forming a filter element with an upper surface, an underdrain cavity below the filter element, an effluent inlet above the surface, and a filtered effluent outlet connected to the underdrain cavity. A backwash outlet is located in the tank above the upper surface. Means are provided for pumping liquid into the underdrain cavity and up through the filter element, for directing fluid through the backwash outlet, and for energizing the pumping apparatus for backwashing. Fluid to be filtered is forced upward through the filter element and into the tank. The filtering occurs at different times than the backwashing. This increases the total filtering time between the necessary backwashings of the filter. (Leibowitz-FIRL)
W75-09326

METHOD AND APPARATUS FOR FLUID COLLECTION AND/OR PARTITIONING,
Corning Glass Works, N.Y. (assignee).
For primary bibliographic entry see Field 5G.
W75-09327

THE BASIC TECHNOLOGY OF THE PULP AND PAPER INDUSTRY AND IT'S WASTE REDUCTION PRACTICES,
Lakehead Univ., Port Arthur (Ontario).
A. J. Bruley.
Canadian Department of the Environment, Training Manual EPS 6-W-74-3. May 1974. 148 p, 60 fig, 13 tab, 11 ref.

Descriptors: *Pulp and paper industry, *Waste treatment, *Technology, Training, Publications, Foreign countries, Canada, Economics, Effluents, Water reuse, Water treatment, *Waste water treatment, Water pollution, Water pollution treatment, History, Industrial wastes, Wastes, Chemistry.
Identifiers: Wood, Pulping, Papermaking.

This training manual is intended for Canadian Environmental Protection Service field representatives whose responsibility involves surveillance of effluents from pulp and paper mills. It reviews the national and regional importance, general pollution abatement picture, and economic outlook of the Canadian pulp and paper industry, and outlines briefly the historical development of paper and papermaking. This is followed by a comprehensive survey of pulp and paper technology, describing processes and materials used, with emphasis on the waste produced from individual operations (wood procurement and preparation, pulping, pulp screening, cleaning, thickening, and bleaching, stock preparation, paper manufacture, and finishing and converting operations). A section devoted to waste reduction practices discusses effluents from a typical kraft mill, water reuse and recycling, external water treatment practices, and waste treatment economics. A bibliography and glossary of pulp and paper terms and an appendix on wood chemistry are included. (Witt-IPC)
W75-09334

DEVELOPMENT AND EVALUATION REPORT: PHYSICAL-CHEMICAL MARINE SANITATION SYSTEM,
General American Transportation Corp., Niles, Ill.
J. M. Heeney, R. B. Neveril, E. K. Krug, and G. A. Remus.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 846, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-670/2-74-043, May 1974. 78 p, 18 fig, 10 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Ships, Suspended solids, Biochemical oxygen demand, Activated carbon, Chlorination, Disinfection, Treatment facilities, Economics, Capital costs, Costs, Filtration, Water pollution sources, Water pollution control, Coagulation, Wastes, Adsorption, Filters, Cellulose, Polymers, Coagulation.
Identifiers: *Marine sewage treatment, Cellulose sponge, Polypropylene, Coagulants.

A physical-chemical system for the onboard treatment of shipboard wastes has been developed. The system is capable of removing suspended solids from raw sewage using the capillary properties of cellulose sponge to draw liquid through a polypropylene filter. The use and effectiveness of a pressure-bed filter and coagulants as filtering techniques are also demonstrated. A series of activated carbon adsorption beds were evaluated for the removal of dissolved organic materials, and a chlorination unit with no moving parts was shown to be suitable for disinfection. Evaluation tests of the overall system indicated a range of BOD reductions between 30 and 90% and suspended solids removals between 50 and 90%. The study indicated the operating characteristics of the major components of the treatment system and showed a need for auxiliary filtering or coagulation techniques to handle small particles (below 30 microns). The total cost of such a system suitable for treating wastes onboard a marine vessle with a crew of 12 to 20 members, generating up to 2650 liters of wastes/day, is estimated to be $14,500-15,000. (Witt-IPC)
W75-09337

A SELECT BIBLIOGRAPHY ON ACTIVATED SLUDGE PLANTS,
British Steel Corp., Sheffield (England).
D. G. Brinn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 358, $3.25 in paper copy, $2.25 in microfiche. Aug 1974, 20 p, 140 ref.

Descriptors: *Bibliographies, *Activated sludge, *Treatment facilities, Sewage treatment, Waste treatment, Design, Operations, Costs, Industrial plants, Water pollution treatment, Water pollution control.
Identifiers: Coke plants.

This bibliography lists about 140 briefly annotated references to the literature on activated sludge plants from 1960 to date. The references are organized under 5 sections, including theory and general design aspects, operation and control, plant descriptions and specific applications, treatment of coke plant effluent, and costs of activated sludge plant operation. (Witt-IPC)
W75-09339

EXPERIMENTAL INVESTIGATION OF THE WET OXIDATION DESTRUCTION OF SHIPBOARD WASTE STREAMS,
Naval Ship Research and Development Center, Annapolis, Md.
P. Schatzberg, D. F. Jackson, and C. M. Kelly.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 061, $4.25 in paper copy, $2.25 in microfiche. Report 4416 (AD 787061), Oct 1974. 38 p, 24 fig, 10 tab, 12 ref, 4 append.

Descriptors: *Waste water treatment, *Sewage treatment, Burning, Chemical reactions, Organic wastes, Kinetics, Laboratory tests, Catalysts, Chemical oxygen demand, Reverse osmosis, Water pollution sources, Water pollution treatment, Wastes, Ships, Oxidation, Disinfection, Water pollution control.
Identifiers: *Marine sewage treatment, *Wet oxidation.

Increasingly stringent water quality regulations anticipate the need for treating all shipboard waste streams containing combustible matter. Ultimate disposal/destruction must include laundry, shower, galley, bilge, and sanitary (human) wastes as well as garbage and refuse. Wet air oxidation or pressurized aqueous combustion conducted at 475-600 F at operating pressures from 600 to 1850 lb/sq inch gage was investigated as one means for the ultimate destruction of organic wastes. This process was investigated by conducting experiments in a 1-gallon pressure vessel with a variety of wastes (sanitary, food, oil, municipal sludge, glucose, and cellulose) under different conditions. Results showed that the wet oxidation process obeys first-order kinetics with an initial fast reduction followed by a slower second reaction. Catalysts have their main influence on the fast reaction, increasing its rate by a factor of three. Applying wet oxidation to destroy waterborne organic wastes consists of taking advantage of the fast reaction. Reduction in organic waste content, expressed as COD, ranged from 60 to 85%, depending on the waste material, after 15 min of reaction time. The use of catalysts can increase this figure to 95%. Additional removal of organic matter can be achieved by further processing the wet oxidation effluent through a reverse osmosis membrane. The wide range of materials capable of being destroyed by wet air oxidation, the innocuous sterile nature of the effluent, and its potential to be recycled with little or no post-treatment make this process a candidate for the ultimate destruction of shipboard wastes. (Witt-IPC)
W75-09340

RESPONSE OF ASPEN TO IRRIGATION BY MUNICIPAL WASTE WATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 3C.
W75-09342

GULF STATES PAPER MAKES BIG MOVE TOWARDS ZERO POLLUTION,
K. E. Lowe.
Pulp and Paper, Vol 49, No 4, p 54-58, April 1975. 6 fig, 3 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, Industrial wastes, Wastes, Water purification, Suspended solids, Activated sludge, Color, Lagoons, Sludge, Dewatering, Incineration, Nutrients, Phosphorus, Nitrogen, Inorganic compounds, Water reuse, Water pollution sources, Water pollution treatment, Sewage treatment, Tertiary treatment, Alabama, Pulp and paper industry, Water pollution control, Oxygenation, Effluents, Biochemical oxygen demand, Sludge treatment.
Identifiers: Ash, Unox oxygenation system, Aluminum oxide, Aluminum silicate, Kraft mills.

The effluent treatment system at Gulf States Paper Corporation's 100 ton/day kraft mill in Tuscaloosa, Alabama, is described. The combined effluent from the pulp and paper mills is first clarified in a primary clarifier to settle out suspended solids, treated in a 4-stage Unox activated sludge plant to remove 85-90% of the BOD, decolored by reacting with an alum-silica slurry (alum mud), and finally clarified to remove the organic precipitate and discharged to a holding lagoon. The sludges from the primary, Unox clarifier, and the color reactor are combined and dewatered in a Beloit-Passavant filter press, and the resulting high-solids sludge is incinerated without auxiliary fuel in a multi-hearth Nichols-Herreshoff furnace. The ash from the furnace, which contains a mixture of aluminum oxide and silicates, is regenerated with sulfuric acid and reused in the color-removal step. Nutrients (1 lb P/11 lb BOD and 1 lb N/15 lb BOD) are added to the effluent as it enters the Unox units. Gulf States eventually plans to reuse most of the purified effluent. (Witt-IPC)
W75-09345

OZONIZATION OF EFFLUENTS OF A KRAFT PULP MILL (OZONIROVANIE STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
Ya. A. Karelin, and Yu. P. Salamatov.
Izvestiya Vysshikh Uchebnykh Zavedenii Stroitel'stuvo i Arkhitektura, Vol 16, No 7, p 136-141, 1973. 1 fig, 6 ref, 3 tab.

Descriptors: *Pulp wastes, *Ozone, *Waste water treatment, *Water purification, Industrial wastes, Wastes, Waste treatment, Water pollution sources, Pulp and paper industry, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Color, Sulfur compounds, Phenols, Effluents, Oxidation, Oxidation lagoons, Water pollution treatment, Biological treatment, Coagulation, Filtration, Sedimentation, Separation techniques, Saturation, Foreign countries, Water reuse, Recycling, Tertiary treatment.
Identifiers: Alumina, Polyacrylamide, Kraft mills, Soviet Union(USSR), Baikal kraft mill.

Ozonization as an additional means of effluent purification was studied on effluents of the Baikal kraft mill producing viscose-grade bleached kraft pulp. The effluent purification system at the mill includes 4 stages, viz., biochemical purification, coagulation with alumina or polyacrylamide, mechanical treatment (sand filter, sedimentation pond), and saturation with oxygen in an aeration pond. The process reduces 5-day BOD to 6-8 mg/liter, COD to 100-150 mg/liter, the suspended solids content to 8-10 mg/liter, and the color index to 80-100. This is considered insufficient. Ozonization experiments, carried out under laboratory conditions, were aimed at determining whether further purification could be achieved, especially the removal of sulfur compounds and phenols. Even under stationary conditions, ozonization was found to be effective in increasing the degree of purifity of biologically treated effluent and of the evaporation condensate. Ozoinzation under dynamic conditions (in a bubbling column) and higher ozone concentrations (up to 120 mg/liter) gave a 65% reduction in COD of the biologically purified effluent, entirely eliminated sulfur compounds and phenols from the evaporation condensate, and reduced the COD of effluent from the filtration stage by 80%. Consequently, ozonization could eliminate the coagulation stage after biochemical purification, and give the possibility of recycling the evaporation condensate. (Stapinski-IPC)
W75-09346

DISSOLVED AIR FLOTATION FOR WOODROOM EFFLUENT TREATMENT,
Kruger Pulp and Paper, Ltd., Bromptonville (Quebec).
Y. Valiquette.
Preprint Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1975, p A-41-44. 3 fig, 9 tab.

Descriptors: *Wood wastes, *Pulp wastes, *Waste water treatment, *Flotation, Water pollution treatment, Industrial wastes, Wastes, Waste treatment, Water pollution sources, Water purification, Bark, Suspended solids, Temperature, Viscosity, Pilot plants, Coagulation, Separation techniques, Biochemical oxygen demand, Canada.
Identifiers: White water, Woodroom effluents.

The dissolved air flotation process has been evaluated at Kruger Pulp and Paper Ltd.'s Bromptonville, Quebec, mill for the removal of suspended solids from woodroom effluent. The woodroom effluent is composed of white water and bark fines and has a suspended solids concentration of 1000-6000 ppm (average 2500-3000 ppm), a temperature of 28-36 C, and a viscosity of between 1.5 and 3.0 centipoises. The main elements of the flotation pilot plant are listed, along with the variables studied (feed rate of raw influent, recirculation rate, initial suspended solids concentration, solids loading rate, initial BOD concentration, influent temperature, and coagulant concentration). The results indicate an 85% removal of suspended solids at a feed rate of 2.3-3.0 U.S. gal/min/sq ft. Adding 1 ppm of a coagulant (anionic polymer) increased this to 93%. The initial BOD load was reduced by 30-45%. (Witt-IPC)
W75-09347

SELECTION OF EFFLUENT TREATMENT SYSTEMS FOR WAUSAU PAPER MILLS COMPANY,
Van Luven Consultants Ltd., Montreal (Quebec).
R. Van Soest, and J. Scott.
Preprint Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1975, p A35-39. 2 fig, 3 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, Industrial wastes, Wastes, Water pollution sources, Biological treatment, Water purification, Water pollution control, Water pollution treatment, Sewage treatment, Wisconsin, Operating costs, Operations, Capital costs, Activated sludge, Effluents, Sulfite liquors, Pulp and paper industry *Pilot plants.
Identifiers: *Zurn-Attisholz effluent treatment process, Sulfite mills.

After extensive pilot plant testing of various effluent treatment systems, Wausau Paper Mills Company (Brokaw, Wisconsin) has decided to install a $4 million treatment facility featuring a clarifier for paper mill effluent and a Zurn-Attisholz two-stage high-rate activated sludge process for treatment of pulp mill effluent. The design and operation of the proposed biological treatment system are described briefly, and capital and expected operating costs are given. Completion is scheduled for mid-1976. Wausau Papers produces magnesium-base bleached sulfite pulp and fine papers. (Witt-IPC)
W75-09349

LOW-COST BIOLOGICAL TREATMENT OF SULFITE MILL EFFLUENT,
Love (L. S.) and Associates Ltd., Brampton (Ontario).
L. S. Love, and F. Guillaume.
Preprint Canadian Pulp and Paper Association, Annual Meeting (Montreal), 1975, p A125-130. 7 fig, 6 tab.

Descriptors: *Pulp wastes, *Sulfite liquors, *Waste water treatment, *Biological treatment, Biochemical oxygen demand, Suspended solids, Toxicity, Industrial wastes, Wastes, Water pollution sources, Aerated lagoons, Activated sludge, Oxygenation, Water purification, *Cost analysis, Sewage treatment, Water pollution treatment, Water pollution control, Laboratory tests, Effluents.
Identifiers: Unox oxygenation system, Sulfite mills.

Laboratory studies were conducted to demonstrate the effectiveness of biological treatment of medium-strength sulfite mill effluent for the removal of 5-day BOD, suspended solids, and fish toxicity. The waste water was prepared by diluting spent sulfite liquor with tap water to a BOD range of 2,000-2,500 mg/liter. Bench scale models of the conventional aerated lagoon, extended aeration activated sludge, and UNOX oxygenation system were used. Both activated sludge processes achieved the desired degree of treatment at 5-day BOD loadings as high as 57 and 139 lb/1,000 cu ft/day, respectively. A preliminary engineering and cost evaluation shows the substantial cost savings that can be obtained when installing an extended aeration plant with integral clarifier, compared with conventional external clarifiers and with the aerated lagoon. This study has confirmed the feasibility of providing secondary treatment for sulfite pulp mill effluents. (Witt-IPC)
W75-09350

5E. Ultimate Disposal Of Wastes

APPARATUSES AND PROCESSES FOR MODERN WASTE WATER TREATMENT AND SEWAGE SLUDGE DISPOSAL (GERAETE UND VERFAHREN NEUZEITLICHER ABWASSEREINIGUNG UND KLAERSCHLAMMBESEITIGUNG),
For primary bibliographic entry see Field 5D.
W75-08857

DESIGN BASIS FOR THE ROTATING DISC PROCESS,
For primary bibliographic entry see Field 5D.
W75-08860

SLUDGE DEWATERING,
For primary bibliographic entry see Field 5D.
W75-08873

DISPOSING OF LIQUID WASTES UNDERGROUND.
Environmental Science and Technology, Vol 9, No 1, p 24, 1975. 1 fig.

Descriptors: *Liquid wastes, *Waste disposal wells, *Injection wells, Aquifers, Potable water, *Florida, Permeability, Waste disposal.

Disposal of wastes by injection into deep wells has been practiced for over fifty years. Within the last decade, however, surface waters have become less capable of receiving effluents within water quality standards, and injection into wells has become an attractive alternative disposal method. For adequate protection of potable water, aquifers used for liquid waste disposal should have the following characteristics: a zone with sufficient permeability, porosity, thickness and area to act as a storage reservoir; and a zone that is vertically below fresh water circulation and confined by rock stratum impermeable to waste liquids. The aquifer should be structured so that waste liquids are injected to a zone at least 1000 feet below the land surface, and one or more strata should be impermeable to the vertical movement of wastes. A test project for a new injection well for sewage-treated effluent is being completed in West Palm Beach, Florida, for 1976. It is a 3500-foot deep well, being constructed for test injection and for subsequent use in monitoring. It is possible that treated water, pumped underground, may be a viable water supply at some future time. (Prague-FIRL)
W75-08881

EXPANDING CLEVELAND'S SOUTHERLY WASTEWATER TREATMENT PLANT.
For primary bibliographic entry see Field 5D.
W75-08882

RADIOECOLOGY OF BOMBAY HARBOR--A TIDAL ESTUARY,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 5B.
W75-08964

STUDIES IN ENVIRONMENT - VOLUME III, POLLUTION AND THE MUNICIPALITY,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09055

RECLAMATION OF ANTHRACITE COAL REFUSE USING TREATED MUNICIPAL WASTEWATER AND SLUDGE,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W75-09131

UPWARD MIGRATION OF DEEP-WELL WASTE INJECTION FLUIDS IN FLORIDAN AQUIFER, SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W75-09190

PRELIMINARY FINDINGS OF A LEACHATE STUDY ON TWO LANDFILLS IN SUFFOLK COUNTY, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-09191

FUTURE OF SANITARY LANDFILL,
Schlitz (Joseph) Brewing Co., Milwaukee, Wis.
For primary bibliographic entry see Field 5G.
W75-09204

ENGINEERING CHALLENGES OF DREDGED MATERIAL DISPOSAL,
Army Engineers Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research.
For primary bibliographic entry see Field 5G.
W75-09205

ASSESSMENT OF OFFSHORE DUMPING; TECHNICAL BACKGROUND: PHYSICAL OCEANOGRAPHY, GEOLOGICAL OCEANOGRAPHY, CHEMICAL OCEANOGRAPHY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 5B.
W75-09278

HUMAN WASTE PYROLYZER,
Franklin Inst. Research Labs., Philadelphia, Pa.
D. Pindzola.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 552, $3.25 in paper copy, $2.25 in microfiche. U.S. Army Land Warfare Laboratory, Aberdeen Proving Ground (Maryland), Technical Report No LWL-CR-02B74, June 1974. 22 p, 4 fig, 5 ref.

Descriptors: *Waste disposal, *Incineration, Urine, Solid wastes, Liquid wastes, Water pollution sources, Ultimate disposal, Waste water(Pollution), Water pollution, *Waste water treatment, Odor.
Identifiers: *Human wastes, *Pyrolysis, Field waste disposal, Feces.

A simple and effective system for thermally reducing and inerting human waste products (feces and urine) has been successfully demonstrated. The modular unit tested should service up to 14 men in its present form. Basic components consist of a 5 gallon collector pail, a liquid-fueled weed burner, and a 30 or 55-gallon openhead drum lined with a mineral fiber blanket of insulation to serve as the furnace enclosure. A 2.5 hr burning period will completely reduce a 37 lb (4 gallon) daily waste load to less than 0.5 lb of dry sterile non-polluting residue. Only 1.7 gallons of liquid fuel are required for the complete operation. The only problems are odor (over a 300 ft radius) and occasional burner flame-out. (Witt-IPC)
W75-09335

5F. Water Treatment and Quality Alteration

GERMFREE WATER PRODUCED BY OZONIZERS (KEIMFREIES WASSER DURCH OZONANLAGEN),
D. Blankenfeld.
CZ Chemie-Technik, Vol 1, No 11, p 527-528, 1972.

Descriptors: *Ozone, *Potable water, *Water treatment, Municipal water, Public health, Rivers, Viral removal, Waste water treatment.
Identifiers: River water, *Ozonizers.

The possible uses of ozone in water preparation are outlined, and preparation of potable water from percolated river water by ozonization is described. Ozone can be used to kill germs, to improve the organoleptic properties, and to oxidize iron, manganese and organic compounds in water. In the Wittlaer waterworks which prepares drinking water from polluted Rhine water, ozone is generated from liquid oxygen, and is used in a closed cycle. Ozone is contacted with a partial stream which is later united with the raw water to avoid bubbling. In the waterworks of the city of Ulm, which extracts water from the Danube and other rivers, ozone is generated from air in a fully automatic ozonization plant. Quantitative oxidation of iron, manganese and phenols, and total destruction of the germs were observed along with a very significant improvement of the organoleptic properties of the drinking water. The activated charcoal consumption for the subsequent final filtration decreased from 30-40 to 3 g/cu m by the use of ozonization. (Takacs-FIRL)
W75-08856

VIRUS INACTIVATION DURING TERTIARY TREATMENT,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5D.
W75-08874

OCCURRENCE AND DETERMINATION OF INORGANIC POLLUTING AGENTS (IN GERMAN),
Munich Univ. (West Germany). Institut fuer Wasserchemie und Chemische Balneologie.
For primary bibliographic entry see Field 5A.
W75-08888

REMOVAL OF PESTICIDES FROM WATER BY VARIOUS WATER TREATMENT METHODS, (IN RUSSIAN),
For primary bibliographic entry see Field 5D.
W75-08933

PLANT SCALE STUDIES OF THE MAGNESIUM CARBONATE WATER TREATMENT PROCESS,
Black, Crow and Eidsness, Inc., Montgomery, Ala.
A. P. Black, and C. G. Thompson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 884, $6.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-660/2-75-006, May 1975. 140 p, 26 fig, 25 tab, 15 ref. EPA Program Element 1BB036, 12120 HMZ.

Descriptors: Water purification, Florida, Coagulation, Magnesium, Alabama, *Sludge treatment, Recycling, *Magnesium carbonate, *Water treatment, Water reuse.
Identifiers: Carbonation, Chemical recovery, Treatment comparison, Alum treatment process.

The magnesium carbonate process of water treatment has replaced alum in a portion of two water plants in full scale studies conducted over the past two and one-half years. This new water treatment technology was compared to the presently used alum process in parallel treatment using identical units in Montgomery, Alabama and Melbourne, Florida. The results indicate a number of significant advantages; primarily that the existing problem of sludge disposal in Melbourne's case is completely eliminated and at Montgomery is greatly reduced. All water is recycled within the process along with the three basic water treatment chemicals - lime, magnesium bicarbonate, and carbon dioxide. Other advantages were increased floc settling rates, simplicity of operation and control, reduced costs when sludge treatment and disposal costs are considered, and more complete disinfection. In Melbourne's case, considerable energy would be conserved by on-site lime recovery. (EPA)
W75-08939

ENVIRONMENTAL SYSTEMS APPRAISALS AND DEVELOPMENT GUIDES.
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W75-09107

DECENTRALIZED WATER REUSE SYSTEMS IN A WATER SCARCE ENVIRONMENT: THE TOURIST INDUSTRY IN ST. THOMAS, VIRGIN ISLANDS,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W75-09297

FILTER APPARATUS,
A. M. Timpe.
United States Patent 3,814,252. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 923, No 1, p 156, June 1974. 1 fig.

Descriptors: *Patents, *Water treatment, Water pollution, Water supply, *Filters, Equipment, Screens, *Filtration.

From a source of supply, water is added to a first chamber, and from an exit opening in the lower part of the first chamber is welled up into a second chamber through a filter element. From the second chamber, water overflows on the filtered side through a fine screening element into a third chamber which is smaller in volume. It then flows to an outlet connecting with utilization pipes and a further inlet where such products as fertilizer may be admixed with the water. A low sidewall of the second chamber below the filter element may pivot to an open position, making removal of sediment possible by the water pressure entering from the first chamber. (Leibowitz-FIRL)
W75-09308

COMPARISON OF WATER CHLORINATING PROCESSES FOR ARMY FIELD APPLICATIONS,
Life Systems, Inc., Cleveland, Ohio.
K. K. Kacholia, and R. A. Wynveen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 672, $11.25 in paper copy, $2.25 in microfiche. U S Army Medical Research and Development Command (Washington, DC), Final Report ER-197-6, May 1974. 120 p, 45 fig, 12 tab, 19 ref.

Descriptors: *Chlorination, *Potable water, *Water treatment, Chemicals, Calcium compounds, Disinfection, Water purification, Design criteria, Design, Maintenance, Reliability, Operations, Performance, Size, Weight, Water chemistry, Chlorine, Equipment.
Identifiers: *Hypochlorite generator, Calcium hypochlorite, Sodium hypochlorite, Chlorine dioxide, Mechanical feeders, Military.

A study was successfully completed which compared chlorination of field potable water with aqueous calcium hypochlorite metered with chemical feeding pumps and sodium hypochlorite or chlorine generated on-site. Current Army chlorination practices were first investigated, and all types of on-site hypochlorinators were surveyed. Utilizing this information, design data were developed for an on-site hypochlorite generator sized to meet current military needs. Criteria for comparing mechanical feeders and on-site generators included maintainability/reliability, ease of operation, performance, size, and weight. On a scale from zero to 100%, where 100% represents an ideal chlorination source, the mechanical feeder system and the on-site hypochlorinator system were rated at 87.7 and 87%, respectively. These ratings are based on answers of 6 military and civilian personnel to a questionnaire. Answers of another group of 36 military sanitary and health engineers led to ratings of 88.6 and 84.3%, respectively. Thus, it is concluded that the two systems compare favorably with an ideal system and both are satisfactory for field application. (Witt-IPC)
W75-09336

5G. Water Quality Control

METALS AND METALLOIDS IN WATER: THEIR IMPORTANCE TO MAN (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
J. Borneff.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. 158(6): 524-529, 1974, English summary.

Descriptors: Metals, *Trace metals, *Potable water, Water quality control, Surface water, Industrial wastes, Pollutants, Water pollution sources, Rivers, Europe.
Identifiers: Germany, *Metalloids, Rhine River, West Germany.

Trace metals in drinking water can impair health. Health can also be endangered through the biological food chain. Certain substances in water are essential for the syntheses of enzymes. Excessive metal concentrations should be avoided. The standards are determined by values of the natural, average ground water. Better control of water is essential because trace elements have rarely been included in drinking water analysis. A continuous surface water control is important in order to detect discharge of dangerous industrial wastes. Standards of quality of the Rhine (West Germany) water are set up to guarantee that water pollution is kept within limits.--Copyright 1975, Biological Abstracts, Inc.
W75-08890

WASTEWATER INFILTRATION NEAR THE CITY OF MOUNT SHASTA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-08906

LIVESTOCK AND THE ENVIRONMENT: A BIBLIOGRAPHY WITH ABSTRACTS, VOLUME II,
East Central State Coll., Ada, Okla. School of Environmental Science.
R. H. Ramsey, M. L. Rowe, and L. Merryman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-242 545, $10.00 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Ada, Oklahoma, Report EPA-660/2-75-003, April 1975. 139, 360 ref. R-801454.

Descriptors: *Bibliographies, Cattle, Sheep, Hogs, Poultry, Fish farming, *Feed lots, *Confinement pens, *Research and development, *Farm wastes, Waste identification, Waste treatment, Waste storage, Waste disposal, Agricultural runoff.
Identifiers: *Waste management, Title index, Author index, Keyword index, Animal waste information categories index.

Management and research information on animal wastes has expanded rapidly in recent years. This material has appeared in such diverse sources as journal articles, conference proceedings papers, university publications, government publications, magazine articles, books, and theses. This bibliography was compiled in order to speed the flow of information on findings in one segment of the livestock industry to other segments that could benefit from this technology. Included in this publication are the following indexes: (1) title, (2) author, (3) keyword, (4) animal information categories. These indexes are followed by a section of abstracts of each reference entry found in the bibliography. Single copies of most articles can be obtained in hard copy or microfiche form at cost from the Animal Waste Technical Information Center, School of Environmental Science, East Central Oklahoma State University, Ada, Oklahoma 74820. (EPA)
W75-08937

A REVIEW OF THE LITERATURE ON THE USE OF CALCIUM HYPOCHLORITE IN FISHERIES,
Bureau of Sport Fisheries and Wildlife, Cortland, N.Y. Tunison Lab. of Fish Nutrition.
H. A. Podoliak.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 444, $3.25 in paper copy, $2.25 in microfiche. Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Division of Population Regulation Research, Report FWS-LK-74-05, March 1974. 281 p, 2 tab, approx. 1130 ref.

Descriptors: *Reviews, *Bibliographies, Publications, *Algicides, *Aquiculture, *Disinfection, *Chlorination, *Fish diseases, Bactericides, Calcium compounds, Chlorine, Fisheries, Microorganisms.
Identifiers: *Calcium hypochlorite.

A complete review of the literature concerning the use of calcium hypochlorite is included in this recommendation for the registration of calcium hypochlorite for use in fish hatcheries, fish farms and fish laboratories. Calcium hypochlorite is a high test, stable and convenient chlorine source used for 'sterilization' of hatcheries or other fish holding facilities for eradication of infective diseases. Disease prevention through routine sanitation of fisheries facilities requires a convenient sanitizer. (Katz)
W75-08952

THE ENVIRONMENT OF OFFSHORE AND ESTUARINE ALABAMA,
Geological Survey of Alabama, University. Environmental Div.
For primary bibliographic entry see Field 2L.
W75-08961

A SUBMERGED HYPOLIMNION AERATOR,
Union Carbide Corp., Tarrytown, N.Y. Aquatic Environmental Sciences.
A. W. Fast, V. A. Dorr, and R. J. Rosen.
Water Resources Research, Vol 11, No 2, p 287-293, April 1975. 7 fig, 12 ref.

Descriptors: *Aeration, *Hypolimnion, *Oxygenation, *Dissolved oxygen, Water treatment, Oxygen, Zone of aeration, Stratification, Lakes, Thermocline, Eutrophication, Productivity, Fish, Nutrients, Aquatic life, Thermal stratification, Algae, *Water pollution control, *New York.
Identifiers: *Lake Waccabuc(NY).

A new hypolimnetic aeration system was described. This system increased the hypolimnetic oxygen concentrations of Lake Waccabuc, New York, from 0.0 mg/l to over 4.0 mg/l, while at the same time preserving thermal stratification. These improvements and others created a suitable habitat for cold-water fish, but care must be exercised in the use of the system to avoid problems of nitrogen gas supersaturation. (Henley-ISWS)
W75-08971

WATER QUALITY AND WASTE TREATMENT REQUIREMENTS ON THE UPPER HOLSTON RIVER, KINGSPORT, TENNESSEE, TO CHEROKEE RESERVOIR.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W75-08996

THE PHOSPHORUS BUDGET OF CAMERON LAKE, ONTARIO: THE IMPORTANCE OF FLUSHING RATE TO THE DEGREE OF EUTROPHY OF LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09023

ENGINEERING ASPECTS OF POLLUTED LKE RECLAMATION,
Notre Dame Univ., Indiana. Dept. of Civil Engineering.
W. F. Echelberger, and M. W. Tenney.
In: Proceedings Second Annual Environmental Eingineering and Science Conference, April 20-21, 1972, Speed Scientific School, University of Louisville, Kentucky, p 431-447, 6 fig, 4 tab, 17 ref.

Descriptors: *Water treatment, *Lakes, *Reclamation, *Fly ash, *Nutrient removal, Adsorption, Organic matter, Sedimentation rates,

Gypsum, Phosphorus, Pozzolans, Waste disposal, Ultimate disposal, Rehabilitation, Sealants, Lake sediments, *Michigan.
Identifiers: Lake restoration, Stone Lake(Mich).

Certain properties and characteristics of fly ash make it amenable for use in alleviating eutrophication. Notable are its adsorptive properties which provide effective removal of soluble organic matter from polluted water, water extracts of lime and gypsum which effectively precipitate inorganic phosphorus, pozzolanic properties which enhance sealing of sediments, and particulate nature combined with specific gravity characteristics that allows the fly ash to settle readily. Field studies have centered around treatment of isolated columns (in situ) of lake water with fly ash followed by monitoring resulting changes. Addition of fly ash, at application level of approximately 10 g/l, to the water columns resulted in excellent reduction of inorganic phosphorus, suspended matter, water color and organic concentrations. The fly ash readily settled onto the sediments at the bottom of the isolated columns and developed a physical barrier at the sediment-water interface impairing release of bottom pollutants into overlying water during extended periods of anoxic environmental stress. Fly ash utilization in reclamation of polluted lakes is an unique opportunity for ultimate disposal of a major pollutant and at the same time contributing to lake reclamation. (Jones-Wisconsin)
W75-09034

A STUDY OF THE REMOVAL OF PESTICIDES FROM WATER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 5D.
W75-09052

STUDIES IN ENVIRONMENT - VOLUME I-SUMMARY REPORT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09053

STUDIES IN ENVIRONMENT - VOLUME II - QUALITY OF LIFE,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09054

STUDIES IN ENVIRONMENT - VOLUME III, POLLUTION AND THE MUNICIPALITY,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09055

STUDIES IN ENVIRONMENT - VOLUME IV - CONSUMPTION DIFFERENTIALS AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09056

STUDIES IN ENVIRONMENT - VOLUME V - OUTDOOR RECREATION AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09057

CONTROLS DRY UP WET WEATHER POLLUTION,
Metcalf and Eddy, Inc., Mass.
For primary bibliographic entry see Field 5D.
W75-09061

OPTIMAL RISK-BASED DESIGN OF STORM SEWER NETWORKS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-09082

DELAWARE RIVER BASIN COMMISSION ANNUAL REPORT, 1974.
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 6E.
W75-09093

MULTIOBJECTIVE WATER RESOURCES PLANNING, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-09123

OIL SPILL PROTECTION IN THE BALTIC SEA,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
L. Landner, and A. Hagstrom.
Journal Water Pollution Control Federation, Vol 47, No 4, p 796-809, April 1975. 4 tab, 7 fig, 22 ref.

Descriptors: *Oil pollution, *Pollutant identification, Oil, Water quality control, *Oil spills, *Oil wastes, *Water pollution control, *Legislation, Analytical techniques, Toxicity, Environmental effects, Water pollution sources, Brackish water, Biodegradation, Crustaceans, Molluscs, Fish.
Identifiers: Oil tagging, *Baltic Sea, Sweden, Sticklebacks, Mytilus, Gammarus, Neomysis, Corexit.

Persuant to an agreement among Baltic Sea countries, Sweden has enacted strict legislation regarding the discharge of oil into its territorial waters and instituted a new control system. However, the number of accidental or illegal discharges from tankers in the Baltic is still unacceptably high. A program to combat such spills has been undertaken and is partially complete, and an oil spill research group has been formed by the Swedish Coast Guard, the National Environmental Protection Board, the Swedish Petroleum Institute, and the Water and Air Pollution Research Laboratory. Oil tagging, research on the environmental effects of oil spills, and analytical techniques are integrated into the new control system. (Katz)
W75-09156

SALT-BALANCE STUDY OF PAUBA VALLEY, UPPER SANTA MARGARITA RIVER AREA, RIVERSIDE COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-09177

ASSESSMENT OF EFFICIENCY IN DIGESTIBILITY OF MOSQUITO LARVAE BY LARVICIDAL FISHES,
Taraporewala Marine Biological Research Station, Bombay (India).
G. A. Shirgur.
J Anim Morphol Physiol. 19(2): 166-180. Illus. 1972.

Descriptors: *Mosquitos, *Fish, *Larvae, *Digestion, *Insect control, Larvicides, Evaluation.
Identifiers: Carassius-auratus, Digestibility, Panchax-panchax, Rasbora-daniconius.

Studies were made on chitinolytic activity in alimentary canals of 9 spp. of larvicidal fishes, to ascertain their efficiency in digesting mosquito larvae possessing a chitinous exoskeleton. Initial in vivo studies were made and the rate of food passage was the fastest in Panchax panchax and the lowest in Carassius auratus. Chitinous remains from fecal pellets in different larvicidal fishes were analyzed, showing that exoskeletons were crumpled and loose textured. Subsequent in vitro studies showed that C. auratus had maximum chitinolytic activity, whereas Rasbora daniconius had the least. Correlation between rates of passage of chitinous food in different fishes and respective strengths of chitinolytic activity indicated that P. panchax was the most efficient in chitin digestion and the fastest in rate of food passage, whereas C. auratus was the least in such a capacity.--Copyright 1974, Biological Abstracts, Inc.
W75-09203

FUTURE OF SANITARY LANDFILL,
Schlitz (Joseph) Brewing Co., Milwaukee, Wis.
B. Thompson, and I. Zandi.
Journal of the Environmental Engineering Division, Proceedings of American Society of Civil Engineers, Vol 101, No EE1, Proceedings Paper 11113, p 41-54, February 1975. 9 fig, 2 tab, 37 ref, 1 append.

Descriptors: *Landfills, *Solid wastes, *City planning, *Area redevelopment, Costs, Environmental engineering, Forecasting, Municipal wastes, Waste disposal, Land use, Social aspects, Aerial photography, Parks, Incineration, Leachate.
Identifiers: *Vacant land, Capital improvement costs, Hauling.

A new policy was offered and examined which, upon adoption, could: (1) reduce people's objection to sanitary landfill as a neighbor, (2) significantly increase the amount of land eligible for use as sanitary landfill, (3) reduce to some degree inequity between rich and poor, and (4) provide a more desirable land-use policy. The proposed policy has four salient features: (1) it allows the use of only small sites (20 acres or less); (2) it allows utilization of each site for a short period of time (1 to 3 years); (3) it guarantees that at the end of the designated period, the site will be converted into a community asset, such as a park; and (4) it allows only the most advanced engineering design, construction, and operation to eliminate temporary nuisances as much as possible. The data and analysis presented indicate that (1) in Philadelphia, sufficient vacant land exists within the city limits to operate sanitary landfills for more than 40 years; and (2) the cost of such a plan is within the acceptable range. (Visocky-ISWS)
W75-09204

ENGINEERING CHALLENGES OF DREDGED MATERIAL DISPOSAL,
Army Engineers Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research.
R. M. Meccia, W. C. Allanach, Jr., and F. H. Griffis.
Journal of the Waterways, Harbors and Coastal Engineering Division, Proceedings of American Society of Civil Engineers, Vol 101, No WW1, Proceedings Paper 11096, p 1-13, February 1975. 2 fig, 1 tab, 5 ref, 1 append.

Descriptors: *Dredging, *Waste disposal, *Channels, *Water quality, *Dikes, Environmental effects, Harbors, Research priorities, Sediment load, Spoil banks, Turbidity, Waste disposal, Wildlife habitats, Pipelines, Pumping, Slurries, Pollutants, Sediments, Wetting, Dewatering, Particle size, Mineralogy, Clays, Silts, Planning, Maintenance, Density.
Identifiers: Agglomeration.

The U.S. Army Corps of Engineers has been concerned with the development of navigable waterways in the United States since 1824. In fulfilling its mission, the Corps has been responsible for the annual dredging of approximately 380,000,000 cu yd of bottom sediments. Increasing concern has developed over the impacts of the disposal of these materials. The U.S. Army Engineer Waterways Experiment Station is conducting a nationwide research program to develop alternatives, including consideration of dredged material as a

manageable resource. Problem identification and assessments were summarized, and program progress with emphasis on engineering aspects of the study was examined. This research effort provided solutions to many problems within 2 years and to some of the more difficult and complex ones within 5 years. Of 47 separate projects currently underway or in advanced planning stages in 1974, 30 projects representing approximately 15% of the total anticipated funding were scheduled for completion by the end of fiscal year 1974. (Roberts-ISWS)
W75-09205

ANALYTICAL MODEL OF HYDRAULIC PIPELINE DREDGE,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 8C.
W75-09206

INDIANA STREAM POLLUTION CONTROL BOARD V. U.S. STEEL CORP (APPEAL FROM ORDER SETTING ASIDE BOARD'S ORDER AGAINST CORPORATION, BOARD APPEALS FROM DETERMINATION THAT ITS FINDINGS WERE INSUFFICIENT).
For primary bibliographic entry see Field 6E.
W75-09240

GUARDING OUR WATER RESOURCES, 1974 ANNUAL REPORT.
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-09243

THE PEOPLE'S LAKE,
Save Lake Superior Association, Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-09247

REVIEW OF NPDES PERMITS.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 39, No 191, p 35369-35373, October 1, 1974.

Descriptors: *Administrative agencies, *Federal government, *Permits, *Water pollution, *Navigation, Administration, Regulation, Coordination, Legal aspects, Legislation, Water Quality Act, Federal Water Pollution Control Act, Navigable rivers, Navigable waters, Obstruction to flow, Solid wastes, Wastes, Disposal, Suspended solids, Water pollution sources.
Identifiers: Administrative regulations, Navigation obstructions, *National Pollutant Discharge Elimination System, Effluent limitations, Environmental policy, Hazardous substances(Pollution).

The proposed regulation, 402(b)(6) of the Federal Water Pollution Control Act of 1972, prescribes the policy, practice, and procedures to be followed by all District and Division Offices in their review of proposed National Pollutant Discharge Elimination System (NPDES) permit applications as to their effect on navigation and anchorage. In order to promote coordination with the Environmental Protection Agency (EPA) and states with approved NPDES programs, the regulation requires that the District Engineer meet with appropriate Regional Administrators or states. To insure that the interests of navigation and anchorage are protected in the administration of the NPDES permit program the District Engineer may issue permits only if the applicant will not substantially impair navigation and anchorage. In reviewing a proposed NPDES discharge as to its effect on navigation and anchorage, and in developing appropriate terms and conditions to granting permits, the District Engineer must consider the nature, characteristics, and average daily discharge by weight of any suspended solids to be discharged by the applicant. (Fernandez-Florida)
W75-09248

EFFLUENT GUIDELINES AND STANDARDS--GENERAL PROVISIONS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 24, Part II, p 4532-4533, February 4, 1974.

Descriptors: *Administrative agencies, *Standards, *Effluents, *Waste treatment, *Federal Water Pollution Control Act, Water quality, Water quality control, Federal government, Water pollution, Legislation, Water pollution control, Water pollution sources, *Water quality standards, Control, Wastes, Industrial wastes, Regulation, Treatment facilities, Waste water(Pollution).
Identifiers: Administrative regulations, Effluent limitations, FWPCA Amendments of 1972, Pretreatment standards(Effluent), Environmental policy, Hazardous substances(Pollution).

This notice amends 40 CFR Chapter I, by adding a new Subchapter N and new Part 401. These regulations provide effluent limitations guidelines for existing sources, standards of performance for new sources, and pretreatment standards for new and existing sources for particular categories of point sources to be issued under 40 CFR Parts 402 through 699. Part 401 is intended to provide a description of the applicable legal authorities and definitions which will apply throughout the series of individual regulations. General definitions have been expanded to include certain additional terms such as process waste water, process waste water pollutants, non-contact cooling water, noncontact cooling water pollutants, and blowdown. The authority under the Federal Water Pollution Control Act, as amended, for promulgation of these rules is described; and provision is made for future revision to update the list of terms, definitions, abbreviations and parameters. (Fernandez-Florida)
W75-09249

CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATION GUIDELINES, STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 26, Part II, p 4708-4728, February 6, 1974.

Descriptors: *Administrative agencies, *Regulation, *Aeration, *Oxidation, *Recycling, Standards, Federal government, Water pollution, Environmental engineering, Environmental sanitation, Federal Water Pollution Control Act, Industrial wastes, Liquid wastes, Solid wastes, Treatment facilities, Waste treatment, Waste water(Pollution), Waste water treatment, Wastes, Water pollution control, Water pollution sources.
Identifiers: Administrative regulations, Effluent limitations, FWPCA Amendments of 1972, Environmental policy, Hazardous substances(Pollution), Pretreatment standards(Effluent).

Pursuant to the Federal Water Pollution Control Act, as amended, the Environmental Protection Agency gives notice of proposed effluent limitations guidelines, standards of performance, and pretreatment standards for the canned and preserved seafood processing point source category. Regulations are proposed for the following subcategories of processing: farm-raised catfish, conventional and mechanical blue crab, Alaskan crab meat and crab section, dungeness and tanner crab, Alaskan shrimp, Northern shrimp, Southern nonbreaded shrimp, breaded shrimp, and tuna. Waste water treatment and control technologies are discussed in terms of the best practicable control technology currently available; the best available technology economically achievable; and the best available demonstrated control technology, processes and operating methods. Approaches include: partial recycle of line fish holding tank water, solids and by-product recovery, aerated lagoons and oxidation ponds, and spray irrigation of process waste water. (Fernandez-Florida)
W75-09250

TEXTILE INDUSTRY POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 25, Part 11, p 4628-4638, February 5, 1974.

Descriptors: *Textiles, *Waste treatment, *Standards, *Effluents, *Administrative agencies, Federal Water Pollution Control Act, Water quality, Water quality control, Federal government, Water pollution, Water pollution control, Water pollution sources, Water quality standards, Control, Wastes, Industrial wastes, Regulation, Treatment facilities, Waste water(Pollution), Fabrics, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Coliforms.
Identifiers: Administrative regulations, Effluent limitations, FWPCA Amendments of 1972, Pretreatment standards(Effluent), Environmental policy, Hazardous substances(Pollution).

Pursuant to the Federal Water Pollution Control Act, as amended, the Environmental Protection Agency proposed effluent limitations guidelines for existing sources, and standards of performance, and pretreatment standards for new sources in the textile manufacturing category of point sources. The textile manufacturing industry has been divided into seven subcategories comprised of a number of mill types which have been determined to have dissimilar plant processes and waste characteristics. The subcategories are: wool finishing, wool scouring, greige, woven fabric finishing, knit fabric finishing, carpet, stock and yarn dyeing and finishing. The known significant pollutant characteristics of waste waters resulting from the textile manufacturing industry include: biochemical oxygen demand, chemical oxygen demand, total suspended nonfilterable solids, oils and grease, and pH and fecal coliforms. Treatment and control technology prescribed involves preliminary screening, biological treatment, chlorination, primary sedimentation, and acid coagulation. (Fernandez-Florida)
W75-09251

IRON AND STEEL POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 34, Part III, p 6484-6505, February 19, 1974.

Descriptors: *Administrative agencies, *Standards, *Effluents, *Iron, *Steel, Regulation, Federal government, Water pollution, Environmental engineering, Environmental sanitation, Federal Water Pollution Control Act, *Industrial wastes, Treatment facilities, Waste treatment, Waste water(Pollution), Waste water treatment, Wastes, Water pollution control, Water pollution sources, Iron alloys.
Identifiers: Administrative regulations, Effluent limitations, Pretreatment standards(Effluent), FWPCA Amendments of 1972, Hazardous substances(Pollution).

Proposed effluent limitations guidelines, standards of performance, and pretreatment standards for new sources within the iron and steel manufacturing point source category are presented. Regulations are suggested for the following subcategories: by-product coke, beehive coke, lintering, blast furnace (iron), blast furnace

(ferromanganese), basic oxygen furnace (semi wet air pollution control methods), basic oxygen furnace (wet air pollution control methods), open hearth furnace, electric arc furnace (semi-wet air pollution control methods), electric arc furnace (wet air pollution control methods), vacuum degassing, and continuous casting. Each subcategory is considered in terms of pollutant parameters, waste sources, control and treatment technology, treatment practices (best practicable and best available), new source treatment technology, and costs. (Fernandez-Florida)
W75-09252

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 35, Part II, p 6580-6588, February 20, 1974.

Descriptors: *Industrial wastes, *Effluents, *Standards, *Phosphates, *Phosphorus, Water pollution, Wastes, Solid wastes, Calcium, Water, Federal Water Pollution Control Act, Water pollution control, Water pollution treatment, Environmental effects, Environment, Environmental control, Waste water(Pollution).
Identifiers: Administrative regulations, Effluent limitations.

Final effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources in the phosphate manufacturing category of point sources are established. As a result of public comments and continuing review and evaluation, the following changes have been effected: minor adjustments have been made to reflect an increased number of definitions and analytical definitions; discharge for the 1977 limitation for phosphorus production will be allowed; the total dissolved solids limitations for the manufacture of phosphorus trichloride and phosphorus oxychloride have been replaced with limitations on specific dissolved species; a discharge will be allowed for the 1977 limitation for the manufacture of food grade calcium phosphate; and a provision allows flexibility in the application of the limitations representing the best practicable control technology currently available. Implementing effluent limitations guidelines will substantially reduce the environmental harm which would otherwise be attributable to the continued discharge of polluted waste waters from existing and newly constructed plants in the phosphate manufacturing industry. (Gagliardi-Florida)
W75-09253

CEMENT MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 35, Part III, p 6590-6596, February 20, 1974.

Descriptors: *Industrial wastes, *Effluents, *Cements, *Dusts, *Federal Water Pollution Control Act, Water, Water pollution, Water pollution control, Standards, Regulation, Discharge(Water), Navigable waters, Storage, Pollutants, Water pollution effects, Water pollution sources, Water pollution treatment, Pollution abatement, Pollutant identification, Environmental effects, Waste water(Pollution).
Identifiers: Administrative regulations, Hazardous substances(Pollution), Effluent limitations.

Final effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources in the cement manufacturing category of point sources are established. As a result of public comments and continuing review and evaluation of the proposed regulations by the Environmental Protection Agency, the following changes have been made in the regulations: limitations have been increased for leached dust; provision has been made for the discharge into navigable waters of storage pile runoff as an alternative to complete containment; a provision allowing flexibility in the application of the limitations representing the best practicable control technology available has been added to each subpart of the Federal Water Pollution Control Act for special circumstances that may not have been previously adequately accounted for. Implementing the effluent limitations guidelines will substantially reduce the environmental harm which would otherwise be attributable to the continued discharge of polluted waste water from existing and newly constructed plants in the cement industry. (Gagliardi-Florida)
W75-09254

RUBBER PROCESSING POINT SOURCE CATEGORY--TIRE AND INNER TUBE PLANTS EMULSION CRUMB RUBBER, SOLUTION CRUMB RUBBER, AND LATEX RUBBER SUBCATEGORIES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 36, Part II, p 6660-6667, February 21, 1974.

Descriptors: *Industrial wastes, *Environmental control, *Effluents, *Federal Water Pollution Control Act, *Water pollution sources, Water pollution control, Water pollution, Environment, Environmental effects, Rubber pollutants, Pollutant identification, Pollution abatement, Water pollution effects, Water pollution treatment, Waste water(Pollution), Waste water disposal.
Identifiers: Administrative regulations, Effluent limitations.

The Environmental Protection Agency has proposed effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources within the tire and rubber processing category of point sources. As a result of public comment and continuing review and evaluation, the following changes have been made: the older tire and inner tube plants subcategory and the newer tire and inner tube plants subcategory have been combined and designated as the tire and inner tube plants subcategory; the subparts of the regulation have been numbered to reflect a total of four subcategories instead of five; and provision has been added to the Federal Water Pollution Control Act allowing flexibility in the application of the limitations representing the best practicable control technology currently available. Implementing the effluent limitations guidelines will substantially reduce the environmental harm which would otherwise be attributable to the continued discharge of polluted waste waters from existing and newly constructed plants in the rubber processing industry. (Gagliardi-Florida)
W75-09255

WATER POLLUTION CONTROL--CONSTRUCTION GRANTS FOR WASTE TREATMENT WORKS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-09256

STATE OF OREGON NAVIGABLE WATER QUALITY STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 24, p 4486, February 4, 1974.

Descriptors: *Oregon, *Navigable waters, Water quality, *Water quality control, *Sewage disposal, *Gases, Administrative agencies, Federal government, Water, Water law, Water pollution, Legislation, Water pollution control, Water pollution sources, Control, Quality control, *Water quality standards, Sewage, Wastes, Industrial wastes, Sewage treatment.
Identifiers: Administrative regulations, FWPCA Amendments of 1972, Environmental policy, Hazardous substances(Pollution).

Regulations setting forth standards of water quality applicable to the navigable waters of the State of Oregon, pursuant to section 303 (b) of the Federal Water Pollution Control Act, as amended are proposed. Under section 303 (a) of the Act, the Administrator of the U.S. Environmental Protection Agency (EPA) is required to review water quality standards for interstate and intrastate waters adopted and submitted by the states. If the state does not adopt provisions in compliance with the requirements of the Act, the EPA Administrator may publish proposed revised water quality standards. The State of Oregon adopted water quality standards for both interstate and intrastate waters, but failed to adopt a total dissolved gas criterion which is consistent with the applicable criteria adopted by the bordering states of Idaho and Washington. Evidence indicates that the proposed Oregon total gas criterion is unreasonably stringent and generally unachievable. The proposed new EPA regulation thus provides that the concentrations of total dissolved gas relative to atmospheric pressure at the point of sample collection shall not exceed one hundred percent of saturation except when stream flows are less than the average minimum seven days low flow which occurs once in ten years. (Fernandez-Florida)
W75-09261

OIL POLLUTION ACT AMENDMENTS OF 1973.
Law and Policy in International Business, Vol 6, No 4, p 1251-1261, 1974. 78 ref.

Descriptors: *Oil pollution, *Oil spills, *Legislation, *Oceans, *Design standards, Water pollution, Water pollution sources, Oily water, Fuels, Oil, International waters, Legal aspects, Penalties(Legal), Regulation, Water law, Ships, Transportation, Control, Standards, Specifications, Federal government.
Identifiers: Hazardous substances(Pollution), *Oil Pollution Act, Coastal waters, Environmental policy, International agreements, Liability(Legal aspects), Non-point sources(Pollution).

The 1973 Amendments to the 1961 Oil Pollution Act were adopted as a positive step toward the elimination of maritime oil pollution caused by oil tankers and other vessels. The rigorous standards of the Amendments in regulating the discharge of oil at sea and new tanker construction requirements designed to minimize oil outflow in the event of collision or stranding are discussed. Weaknesses, loopholes, and ineffective enforcement of antipollution standards under the 1961 Act are considered. Ramifications of the 1973 Amendments and their impact upon discharge standards, exemptions, tanker construction, criminal penalties, and various additional enforcement mechanisms are analyzed. Collateral effects on tanker operation and construction costs are reviewed in terms of higher carriage rates, and resultant higher prices for gasoline, home heating oil, lubricants, and other petroleum products. Although the Amendments represent no more than a limited step in the effort to eliminate oil pollution of the seas, this legislation demonstrates considerable progress. (Fernandez-Florida)
W75-09264

A PROPOSED METHOD OF WASTE MANAGEMENT IN CLOSED-CYCLE MARICULTURE SYSTEMS THROUGH FOAM-FRACTIONATION AND CHLORINATION,
Delaware Univ., Newark. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.

W75-09279

COMPUTER PROGRAMS IN USE IN THE WATER QUALITY BRANCH, VOL 5, WATER QUALITY DATA: POWER SPECTRUM (HARMONIC) ANALYSES AND FREQUENCY,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 7C.
W75-09289

HUCHO HUCHO L. IN MARAMURES WATERS, (IN ROMANIAN),
Institutul Pedagogic Baia-Mare (Rumania).
R. Frank.
Ocrotirea Nat, Vol 16, No 1, p 13-20, 1972, Illus.

Descriptors: *Fish reproduction, Spawning, *Water quality standards, Water pollution control, Distribution, *Growth rates, Water pollution effects.
Identifiers: *Hucho-hucho, Pisciculture, *Romania(Maramures), Roe.

By the end of the last century, Hucho hucho occurred in the major watercourses in Romania. Currently, it occurs only in Moldova, Bistrita and some tributaries, Tisa, ans some rivers in Maramures. Among the causes of reduction of the species, some are biological matters, H. hucho has a rapid growth rate, almost 10 times faster than that of the carp. Consequently, it became an item of attraction and profit for the residents of the areas involved. However, the reproductive rates is slow (the 1st roe are deposited at the age of 4-5 yr). Snow thawing coincides with the spawning period, and consequently torrents are destructive. Environmental deterioration as a result of irrational timber cutting, dams, water pollution, and rafting had a negative effect which in some cases irreversibly altered the environmental setup. The measures suggested for providing adequate conditions include strengthening pisciculturai regulations, establishing preserves, replanting some river banks, afforsting and fighting water pollution.--Copyright 1974, Biological Abstracts, Inc.
W75-09304

SYSTEM FOR SEPARATING HYDROCARBONS FROM WATER,
Fram Corp., East Providence, R.I. (Assignee).
J. D. Conley, D. E. Belden, and R. D. Terhune.
United States Patent 3,878,094. Issued April 15, 1975. Official Gazette of the United States Patent Office, Vol 933, No 3, p 1340, April 1975. 1 fig.

Descriptors: *Patents, Waste water treatment, *Separation techniques, *Oil wastes, Oily wastes, Pollution abatement, Oil pollution, Water pollution control.
Identifiers: Oil-water separation.

A system is described for removing hydrocarbon pollutants from a water stream to provide a purified effluent stream. A separator removes free and entrained hydrocarbons from the stream; this separator has separate hydrocarbon and water outlets and a mechanical emulsion breaker for removing emulsified hydrocarbon from the stream. The emulsion breaker consists of an inlet connected to the separator water outlet, a control mounted to continuously sense the hydrocarbon-water interface in the separator, and valves for controlling the flow rates through the outlets. Controls are connected to the valves for adjustment of flow rates in response to changes in the position and the interface to counteract changes therein. Thus the system is closed and pressurized. A fluid analyzer and an associated conduit continuously sample water effluent from the emulsion breaker and recycle the sample to the effluent stream. (Prague-FIRL)
W75-09307

APPARATUS FOR PREVENTING OIL POLLUTION,
Texaco Development Corp., New York. (assignee).
R. Tuggle, R. H. Graves, and R. J. DeRouen.
Canadian Patent 964,475. Issued March 18, 1975. Patent Office Record, Vol 103, No 11, p 16, March, 1975.

Descriptors: *Oil pollution, *Water pollution control, *Patents, Equipment, *Pollution abatement.

An oil pollution control device isolates a segment of a substantial body of water into which oil may be then introduced. The isolated portion extends from above the surface to near the bottom of such a water body. For example, a vertical caisson with its base extending into the bottom of the body of water and with openings just above the bottom may be utilized, permitting circulation of water at that level. (Prague-FIRL)
W75-09314

APPARATUS FOR IMPROVED SHIPPING OF CRUDE OIL RELATIVE TO ENVIRONMENTAL DAMAGE AND ECOLOGICAL PROBLEMS,
J. M. Elson.
United States Patent 3,864,935. Issued February 11, 1975. Official Gazette of the United States Patent Office, Vol 931, No 2, p 563-564, February, 1975. 1 fig.

Descriptors: *Patents, *Oil, *Transportation, *Oil spills, Equipment, Environmental effects, *Water pollution control.
Identifiers: Shipping.

Equipment is described for use in shipping crude oil between two geographical locations, in order to avoid oil spills. Equipment is included to freeze the oil into molds in the shape of geometrical forms for transportation. The tranportation means include a tube through which the units of oil are transported; the tube's cross-section corresponds to the geometrical forms of the molds. The freezing apparatus also has the function of freezing water or a fluid other than oil. Means for pouring oil into the containers, and for closing the containers also are described. (Prague-FIRL)
W75-09319

TRAP TO CLEANSE OIL-POLLUTED WATER,
M. S. Kharchenko.
Soviet Patents 410,998. Issued May 30, 1974. Derwent Soviet Patents Report, Vol 5, No 42, p 1, November 26, 1974 1 fig.

*Patents, *Oil spills, Water treatment, Pollution abatement, Flotation, Equipment, Oil pollution, Separation techniques, Waste water treatment.
Identifiers: *Traps(Pollution).

A trap to cleanse oil-polluted water has a protective grid, injectors, flotation, and foam chambers. To increase effectiveness of operation, each oil trap is in the form of a hull of varying sections with protective grills, consisting of, in sequence, a flotation chamber with air distribution injectors, a foam-forming chamber, a foam pumping-out chamber and a chamber for ejecting cleansed liquid. Fluid passes through a protective grid, entering a flotation chamber, where air from a compressor via injectors saturates the polluted liquid. Foam from a chamber is directed into the restricting chamber and then with the aid of a froth-suction manifold and a fan, it is directed onto a pollutant collecting tank. The cleansed fluid then passes through a chamber and is ejected. (Prague-FIRL)
W75-09323

COALESCENCE OF SMALL SUSPENDED DROPS E. G. OIL FROM WATER.
Netherlands Patent 73745V/42. Issued October 2, 1974. Derwent Netherlands Patents Report, Vol 5, No 42, p 1, Novermber 26, 1974.

Descriptors: *Patents, *Suspensions, *Oil pollution, Equipment, Waste water treatment, Lime, Water pollution control, Pollution abatement.
Identifiers: Floating plastic balls.

A system was described for the coalescence of small suspended drops of oil from water. Liquid containing a finely divided contaminant such as suspended oil drops, is passed through a bed containing floating plastic balls, one to ten mm in diameter. The balls should be wetted by the oil. The flow should be in the direction in which the contaminant settles, upwards for oil in water. The oil drops collide with each other and the balls and coalesce. Abrasion best removes deposits of lime, and the bed may be agitated for this purpose. The bed operates longer than conventional equipment without blocking. (Prague-FIRL)
W75-09325

METHOD AND APPARATUS FOR FLUID COLLECTION AND/OR PARTITIONING,
Corning Glass Works, N.Y. (assignee).
C. M. Lawhead.
United States Patent 3,814,248. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 923, No 1, p 155, June, 1974. 1 fig.

Descriptors: *Patents, *Water quality control, *Sampling, Equipment, *Separation techniques, Centrifugation, Water analysis, Instrumentation, Homogeneity.
Identifiers: Spools.

Spools or partitioning assemblies have been designed to be used with rigid tubular containers for effecting the physical or the complete physical and chemical partitioning of the heavier fluid phase from the lighter fluid phase of a centrifugally separated fluid sample. Each spool has a central axial orifice and a resilient annular wiper portion. The wiper portion includes a container-contacting surface and is adapted to engage the inner surface of the container and an integral annular skirt portion. Because the specific gravities of the spools are between the specific gravities of the fluid phases, the spools move downward in the containers to the vicinity of the fluid phase interface. The lighter fluid phase flows upward through the central orifice. Physical partitioning occurs by the combination of a spool or spool-diaphragm with a natural plub of the heavy phase fluid, which acts to retain the heavy fluid phase. Complete physical and chemical partitioning is accomplished by combining a float apparatus and a spool to form a continuous line contact seal on the inner surface of the spool skirt portion. The partitioning assemblies can be used in evacuated fluid collection tubes or in atmospheric pressure tubes. (Leibowitz-FIRL)
W75-09327

PROCEEDINGS TALL TIMBERS CONFERENCE ON ECOLOGICAL ANIMAL CONTROL BY HABITAT MANAGEMENT, NO. 4.
Tall Timbers Research Station, Tallahassee, Fal.
For primary bibliographic entry see Field 2I.
W75-09333

FOREST PRODUCTS POLLUTION CONTROL ANNOTATED BIBLIOGRAPHY (EXCLUDING PULP AND PAPER),
Western Forest Products Lab., Vancouver (British Columbia).
For primary bibliographic entry see Field 10C.
W75-09341

GULF STATES PAPER MAKES BIG MOVE TOWARDS ZERO POLLUTION,
For primary bibliographic entry see Field 5D.
W75-09345

THE BOD AND TOXICITY OF EFFLUENTS FROM SULFITE PULPING FOR NEWSPRINT,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
For primary bibliographic entry see Field 5B.
W75-09348

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMAL TIMING, SEQUENCING, AND SIZING OF MULTIPLE RESERVOIR SURFACE WATER SUPPLY FACILITIES,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 4A.
W75-08928

STOCHASTIC VARIATION OF WATER QUALITY OF THE PASSAIC RIVER,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering.
For primary bibliographic entry see Field 5A.
W75-09080

BENEFITS AND LAND USE CHANGE CONNECTED WITH A FLOOD CONTROL PROJECT,
Dayton Univ., Ohio. Dept. of Economics.
For primary bibliographic entry see Field 4A.
W75-09081

OPTIMAL RISK-BASED DESIGN OF STORM SEWER NETWORKS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-09082

MULTIOBJECTIVE WATER RESOURCES PLANNING, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-09123

SYSTEMS ANALYSIS OF HYDROLOGIC PROBLEMS.
For primary bibliographic entry see Field 2A.
W75-09210

AN INTRODUCTION TO SYSTEMS ANALYSIS OF HYDROLOGICAL PROBLEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-09211

GAME THEORY,
Utah State Univ., Logan. Dept. of Civil Engineering.
C. G. Clyde.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 223-230. 6 fig, 3 ref.

Descriptors: *Optimization, *Analytical techniques, Mathematical studies, Optimum development plans, Operations research, Decision making.
Identifiers: *Game theory.

Some problem situations require that decisions be made in circumstances of competition where a decision maker must consider competing alternatives. In such circumstances, game theory can be helpful in analyzing the problem, describing the alternatives and selecting an optimum strategy. The examples presented were of rather simple games, i.e., two person zero-sum games with pure and mixed strategies. Each was carried through to its optimum conclusion. (See also W75-09210) (Jess-ISWS)
W75-09218

COMPUTER SIMULATION OF WATER RESOURCE SYSTEMS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2A.
W75-09220

A PROBLEM ORIENTED LIBRARY FOR HYDROLOGY,
McMaster Univ., Hamilton (Ontario). Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 7C.
W75-09222

PRACTICAL APPLICATIONS OF HYDROLOGIC SIMULATION,
Hydrocomp International, Palo Alto, Calif.
For primary bibliographic entry see Field 4A.
W75-09223

CONTROL RULES FOR MULTIPLE-USE RESERVOIRS AND MULTI-RESERVOIR SYSTEMS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 4A.
W75-09224

SOME PROBLEMS IN THE APPLICATION OF SYSTEMS ANALYSES IN WATER RESOURCES SYSTEMS,
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 3B.
W75-09226

6B. Evaluation Process

AN ECONOMIC ANALYSIS OF THE EFFECTS OF A DECLINING GROUND WATER LEVEL IN THE RAFT RIVER BASIN, CASSIA COUNTY, IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.
W75-08921

RECREATION REIMBURSEMENT FOR WYOMING'S NORTH PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
A. S. Hersch.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-242 814, $5.25 in paper copy, $2.25 in microfiche. MS Thesis, February 1974. 112 p, 6 fig, 11 tab, 55 ref, 2 append. OWRR C-4351(9063)(1).

Descriptors: *Recreation, *Pricing, *Payment, *Evaluation, Benefits, *Wyoming, Marginal costs, Average costs, Taxes, Government finance, Permits, Economic efficiency, Social aspects, Income, Economic impact, Indirect benefits, Average costs.
Identifiers: *North Platte River Basin(Wyo), User charges, Reimbursement options.

Development of feasible pricing and reimbursement mechanisms for recreation in Wyoming's North Platte River Basin were based on identification of groups likely to benefit from water resource development projects and conceptualization of the nature of such benefits. Reimbursement mechanisms that might be utilized in project financing are proposed and defined, and alternative reimbursement mechanisms are evaluated utilizing the efficiency, equity, administrative feasibility, and revenue raising ability criteria, with consideration of the various beneficiary groups and the multi-dimensional nature of the project benefits. The selected sites for the study were Glendo Reservoir, Alcova Reservoir, and the 'Miracle Mile.' An attempt was made to ascertain the incidence and direction (positive or negative) of economic impacts of recreation projects upon certain beneficiary sectors and groups. Three accounts--(1) development or economic efficiency, (2) environmental/recreational quality, and (3) social factor effects--were utilized in conceptualizing recreation project impacts. A recommended set of reimbursement mechanisms for each area is proposed with emphasis on a marine fuel tax. Federal-local transfer payments, and facility use fees. (Auen-Wisconsin)
W75-08922

STUDIES IN ENVIRONMENT - VOLUME I-SUMMARY REPORT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09053

STUDIES IN ENVIRONMENT - VOLUME II - QUALITY OF LIFE,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09054

STUDIES IN ENVIRONMENT - VOLUME IV - CONSUMPTION DIFFERENTIALS AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09056

STUDIES IN ENVIRONMENT - VOLUME V - OUTDOOR RECREATION AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-09057

A LAND USE PROGRAM FOR ARIZONA.
Arizona Environmental Planning Commission, Phoenix.
Final Report to the Governor and the Legislature of Arizona, January 15, 1975. 226 p, 2 fig.

Descriptors: *Arizona, *Land use, *Comprehensive planning, *Legal aspects, Legislation, Environment, Natural resources, State governments, Real property.

Responding to a legislative act of 1973, the Arizona Environmental Planning Commission and the Governor's Office of Environmental Planning undertook a 2-year comprehensive and coordinated land use planning program, which reviewed existing roles and responsibilities of relevant State, Federal, and local agencies, land use laws, and the general pattern of court decisions relating to land use regulation in Arizona and other states, relevant federal laws, and the American Law Institute's Model Land Development Code(draft). Recommendations are presented for new legislation and amendments to existing legislation, basic needs are discussed, and background information used in the preparation of the report is presented. Specific geographic areas of state concern are analyzed with respect to special needs for planning at that level. (Paylore-Arizona)
W75-09058

BENEFITS AND LAND USE CHANGE CONNECTED WITH A FLOOD CONTROL PROJECT,
Dayton Univ., Ohio. Dept. of Economics.
For primary bibliographic entry see Field 4A.
W75-09081

ROCK VALLEY METROPOLITAN COUNCIL REGIONAL DEVELOPMENT GUIDE.
Rock Valley Metropolitan Council, Rockford, Ill.
June, 1972. 57 p, 12 fig, 7 tab, 1 append.

Descriptors: *Regional development, *Planning, *Land use, *Urbanization, Regions, Land classification, Natural development, Land development, Rural areas, Zoning, *Illinois, *Wisconsin, River basin development.
Identifiers: *Rock Valley Metropolitan Region(Ill-Wis), Rock River basin(Ill-Wis).

Long-range development of the coalescing urban complex in the Rock Valley Metropolitan Region is considered and recommendations are made. Boone and Winnebago counties in northern Illinois and Rock county in southern Wisconsin, which make up the RVMR, are part of the Chicago-Milwaukee Industrial District. The entire Region is with the Rock River drainage basin. Most of the urban development is located near the river and Interstate 90 which traverse the Region from north to south. Population and economic projections indicate an increasing need for land for housing and employment. The Development Guide expresses regional goals for land and resource use, including preservation of prime land in agriculture, establishment of 'environmental corridors', e.g. floodplains, wetlands, and undeveloped stream shorelines, and the use of areas for urban development soils are suitable and public sewer and water are available. Major region-shaping elements are also considered. Four alternative regional growth patterns are analyzed: continuation of present trends, radial-corridor concept, local planning without regional guidance, and coordinated multiple centers. The last is found most suitable as it preserves the individuality of various communities while conforming best to the regional development goals. (Herr-North Carolina)
W75-09106

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 4A.
W75-09122

MULTIOBJECTIVE WATER RESOURCES PLANNING, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 115, $7.00 in paper copy, $2.25 in microfiche. Water Resources Scientific Information Center, Report OWRT/WRSIC 75-206, May 1975, 176 p. Edited by Daniel P. Loucks, Cornell University, Ithaca, New York.

Descriptors: *Systems analysis, *Bibliographies, *Water resources, Abstracts, Alternative planning, Decision making, Methodology, Project planning, Optimum development plans, *Planning, Multiple purpose.
Identifiers: *Multiobjective planning.

This annotated bibliography contains 112 abstracts of selected documents published since 1968 pertaining to multiobjective water resources planning. Both subject and author indexes are provided. Descriptors are listed with each abstract. The abstracted material emphasizes the theory as well as the application of methods for assisting in the planning and management of water resource systems that must satisfy more than one objective. This report is another in a series of planned bibliographies in water resources produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 82,687 abstracts covering SWRA through March 1, 1975 (Volume 8, Number 5).
W75-09123

LANDSCAPE AESTHETICS NUMERICALLY DEFINED (LAND SYSTEM): APPLICATION TO FLUVIAL ENVIRONMENTS,
Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
W. N. Melhorn, E. A. Keller, and R. A. McBane.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 122, $6.25 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center, Technical Report No 37, April 1975. 149 p, 12 fig, 13 tab, 11 plates, 53 ref, 2 append. OWRT A-018-IND(1).

Descriptors: *Aesthetics, Geomorphology, Rivers, *Streams, Psychological aspects, Value, *Landscaping, Recreation, Wild rivers, Computer programs, *Social values, *Evaluation, Data processing, *River systems.
Identifiers: *Matrix techniques, Scenic environment.

There is developed a quantitative method for objectively assessing the aesthetic values of a fluvial landscape. The LAND (Landscape Aesthetics Numerically Defined) System is an extension of the matrix technique of Leopold. A parametric, computerized data sorting process provides an easy to use method to objectively evaluate natural fluvial landscapes. Landscape evaluation indices, e.g. Uniqueness, Aesthetic, Scenic, Recreational, and Wild are arbitrarily defined or taken from statutory definitions. Preliminary testing of the system suggests that personnel doing the evaluation tend to arrive at essentially the same numerical values regardless of education, background, etc. LAND has been only tested in the evaluation of fluvial systems in terms of physical, biological, water quality, and human factors. However, the system can be adapted to produce a different set of evaluation indices to rank non-fluvial landscapes. The basic computer program for the system is included in an appendix.
W75-09128

THE PARADOX OF PLANNED WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 3B.
W75-09209

THE UNITED STATES IHD PROGRAM,
National Committee for the International Hydrological Decade, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-09213

GAME THEORY,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-09218

SOCIAL ISSUES IN WATER RESOURCES DEVELOPMENT,
Utah State Univ., Logan. Dept. of Sociology.
W. H. Andrews.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 446-452.

Descriptors: *Water resources development, *Social aspects, *Social values, Social needs, Decision making, Aesthetics, Attitudes, Environment, Recreation, Ecology.

Social issues and problems related to water resources development were discussed generally. Issues affecting water resource decisions include population growth, urban problems, environmental or ecological problems, leisure, recreation, and aesthetics. Social indicators and values are associated with problems engineers face and measurement of these indicators will help to predict what kinds of issues that will be important. Discovery of human needs is important and these needs will affect decisions as to what use should be made of water resources, including decisions about irrigation, recreation, aesthetics, or industry. Solutions to the problems of water resource development as they relate to social values and issues were not indicated. (See also W75-09210) (Humphreys-ISWS)
W75-09228

GUARDING OUR WATER RESOURCES, 1974 ANNUAL REPORT.
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-09243

STATE FINANCIAL ASSITANCE OF FLOOD CONTROL PROJECTS.
Arizona Water Commission, Phoenix.
2nd Annual Report to the 32nd Legislature, January 1975. 20 p, 3 fig, 2 tab.

Descriptors: *Arizona, *Flood control, *Project planning, *State governments, *Economics, Long term planning, Watershed management.

1974 activities are summarized that affect Arizona State funds appropriated to assist local sponsors of federally funded flood control projects in the purchase of necessary lands, easements and rights-of-way. Included is a forecast of project developments that will have significant bearing on the assistance program during 1975. As part of a 15-year program, projects for which funds have been appropriated include Indian Bend Wash, and the following watersheds: Williams-Chandler, Buckhorn-Mesa, Wickenburg, and Foote Wash. Construction of the Cave Buttes Dam is proposed for 1975/76. Guidelines for State assistance in administratering the program are included, and an economic summary of the Cave Buttes Dam as a feature of the greater Phoenix Phase B Project is detailed. (Paylore-Arizona)
W75-09301

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

RECREATION REIMBURSEMENT FOR WYOMING'S NORTH PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W75-08922

CONSTRUCTION REQUIREMENTS AND COST ANALYSIS OF GRASSED BACKSLOPE TERRACE SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W75-08926

DETAILED COST ESTIMATED FOR ADVANCED EFFLUENT DESULFURIZATION PROCESSES,
Tennessee Valley Authority, Muscle Shoals, Ala.
For primary bibliographic entry see Field 5A.
W75-08935

COST ANALYSIS OF EXPERIMENTAL TREATMENTS ON PONDEROSA PINE WATERSHEDS,
Forest Service (USDA), Tucson, Ariz. Rocy Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-08940

STRIP-MINED LAND RECLAMATION WITH SEWAGE SLUDGE: AN ECONOMIC SIMULATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5D.
W75-09236

LOW-COST BIOLOGICAL TREATMENT OF SULFITE MILL EFFLUENT,
Love (L. S.) and Associates Ltd., Brampton (Ontario).
For primary bibliographic entry see Field 5D.
W75-09350

6D. Water Demand

AN OUTLINE SCHEME FOR RE-USE OF MOGDEN SEWAGE EFFLUENT,
Fish (Robert) and Partners, London (England).
For primary bibliographic entry see Field 5D.
W75-08877

SOURCES OF EMERGENCY WATER SUPPLIES IN SAN MATEO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
P. R. Wood.
Open-file report 75-43 (San Francisco Bay Region Environmental and Resources Planning Study Basic Data Contribution 71), 1975. 25 p, 2 fig, 5 tab, 20 ref.

Descriptors: *Groundwater resources, *Water supply, *Disasters, *Potential water supply, *California, Dependable supply, Groundwater, Surface waters, Perennial streams, Water quality, Water wells, Hydrologic data, Well data, Water yield, Planning, Earthquakes.
Identifiers: *Emergency water supplies, San Mateo County(Calif).

San Mateo County, Calif., has several densely populated urban areas that get most of their water supplies from surface-water sources that could be damaged by a major earthquake or other general disaster. In the event of such a disaster, limited supplies of potable water may be obtained from selected wells, springs, and perennial streams. This report outlines the principal sources of existing water supplies, gives information on the need for emergency water-supply procedures, presents general criteria needed for selecting emergency water-supply wells, summarizes information for 60 selected water wells, numerous springs, and perennial stream that can be used as sources of water, and describes emergency water-purification procedures that can be used by individuals or small groups of people. There were 571,100 people living in the county in January 1974. A well pumping 50 gal/min over a 16-hour period would yield 48,000 gal of water. Six wells pumping at that rate would yield 288,000 gal of water, which is more than adequate for supplying the minimum daily drinking-water requirement of the county's present population. (Woodard-USGS)
W75-08911

POLICY ALTERNATIVES IN WATER RECHARGE AREAS.
East Central Florida Regional Planning Council, Winter Park.
For primary bibliographic entry see Field 4B.
W75-09095

OAK GLEN WATER-RESOURCES DEVELOPMENT STUDY USING MODELING TECHNIQUES, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-09178

GROUND-WATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
H. W. Bearden.
Florida Bureau of Geology, Tallahassee Report of Investigations No 77, 1974. 35 p, 17 fig, 5 tab, 21 ref.

Descriptors: *Groundwater resources, *Water supply, *Water quality, *Florida, Aquifer characteristics, Water yield, Water wells, Well data, Drawdown, Groundwater recharge, Saline water intrusion, Water demand, Population, Hydrologic data, Chemical analysis, Water level fluctuations.
Identifiers: *Hollywood(Fla).

Population in the Hollywood, Fla., area increased more than 200% from 1960 to 1970 (35,237 to 106,873). This explosion in population is the source of most of the area's water problems. Fresh water for all purposes in Hollywood is derived from the highly permeable Biscayne aquifer. The aquifer is composed chiefly of permeable beds of limestone, sandstone, and sand that extend from land surface to a depth of about 200 feet. Water levels in the aquifer fluctuate chiefly in response to rainfall, the major source of recharge. The water table slopes gently from the west and averages about 1.0 foot higher in the western part of the city than in the eastern part. The configuration of the water table is greatly influenced by Hollywood Canal and the ocean. Because the permeability of the aquifer is high, the effect of pumping wells is dispersed over a large area and drawdowns are about 0.1 foot. Salt-water intrusion from Hollywood Canal is the chief threat to the groundwater supply. When discharge is low, the chloride concentration of water in the canal has reached levels greater than 10,000 milligrams per litre. Salt water has been detected in the aquifer at depth within 0.1 mile of the municipal wells. (Woodard-USGS)
W75-09185

LAND USE AND WATER RESOURCES IN TEMPERATURE AND TROPICAL CLIMATES,
H. C. Pereira.
Cambridge University Press: London, England; New York, NY, 1973, 246 p.
Identifiers: Animals, Books, Climates, Human populations, *Land use, Resources, Temperature, *Tropical climates, *Water resources.

Problems arising from increasing demands made by rapidly growing human populations on their water supplies and on the load from which these flow are described. Chapters discuss: the world's water resources and the growing demand, development of a watershed discipline, achievement of hydrological information, and recorded experience of the effects of forests on watersheds. Other chapters discuss: research on forested watersheds, watershed experiments in tropical forests, effects of grazing animals on watersheds, effects of croplands on water resources, the roles of irrigation and drainage in water resources, and problems and priorities. A list of recommended reading and a list of references are included. Technical terms are used sparingly, but references are given through to specialized source material. The book is intended for use by students of resource management, conservation, water engineering, ecology, agriculture and geography.--Copyright 1973, Biological Abstracts, Inc.
W75-09343

6E. Water Law and Institutions

A LAND USE PROGRAM FOR ARIZONA.
Arizona Environmental Planning Commission, Phoenix.
For primary bibliographic entry see Field 6B.
W75-09058

DELAWARE RIVER BASIN COMMISSION ANNUAL REPORT, 1974.
Delaware River Basin Commission, Trenton, N.J. 1975. 20 p, 3 fig, 22 photos, 1 tab.

Descriptors: *Delaware River Basin Commission, *Delaware River, Comprehensive planning, River basin development, Water supply, Recreation, Project feasibility, Flood control, Environmental effects, Energy, Delaware, New Jersey, New York, Pennsylvania.
Identifiers: *Tocks Island Lake, Environmental Impact Statements.

The 12th annual report of the Delaware River Basin Commission (DRBC) describes actions of this interstate-federal organization in areas of water supply, flood loss reduction, environmental protection, project reviews, pollution abatement, and program planning in the 13,000 square mile Delaware River valley (DL, NJ, NY, and PA). Althogh streamflows were 35% above average in 1974, there was no extensive flooding. Future flood damages will be lessened through wiser land use based on floodplain delineations DRBC is undertaking in 119 municipalities. The relatively undeveloped upper river was closely examined in studies of pollution control, water supply, recreation needs, and nonpoint pollution. A basinwide siting plan for petroleum company facilities is in process, as well as an updated electricity generator site plan. One hundred and thirty projects were cleared after public hearings and DRBC analysis showed no conflict with the Comprehensive Plan. The Tocks Island Lake project is undergoing intensive further study. Wastewater discharge permits, allocating the permissible waste load, have made some improvement in the estuary water quality, but further improvement is required from a majority of dischargers. New and increased water use will no longer be free under a program to offset reservoir costs. (Herr-North Carolina)
W75-09093

FLOOD PLAIN INFORMATION: TOMS RIVER, UNION BRANCH, RIDGEWAY BRANCH AND LONG SWAMP CREEK, OCEAN COUNTY, NEW JERSEY,
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09098

OIL SPILL PROTECTION IN THE BALTIC SEA,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
For primary bibliographic entry see Field 5G.
W75-09156

THE PARADOX OF PLANNED WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 3B.
W75-09209

THE UNITED STATES IHD PROGRAM,
National Committee for the International Hydrological Decade, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-09213

SOCIAL ISSUES IN WATER RESOURCES DEVELOPMENT,
Utah State Univ., Logan. Dept. of Sociology.

For primary bibliographic entry see Field 6B.
W75-09228

INDIANA STREAM POLLUTION CONTROL BOARD V. U.S. STEEL CORP (APPEAL FROM ORDER SETTING ASIDE BOARD'S ORDER AGAINST CORPORATION, BOARD APPEALS FROM DETERMINATION THAT ITS FINDINGS WERE INSUFFICIENT).
313 N E 2d 693 (Indiana 1974).

Descriptors: *Pollution abatement, *Water pollution control, *Water pollution, *Water pollution sources, Steel, Waste water, Effluents, Waste water treatment, Rivers, Lake Michigan, Indiana, Water quality control, Water law, Water resources development, Waste water disposal, Waste water(Pollution), Treatment facilities, Administrative decisions, Legal review, Adjudication procedure, Environmental control, Judicial decisions.
Identifiers: *State policy, *Environmental policy, Administrative regulations.

An appeal was made from the order of the Lake Superior Court reversing an order of the Indiana Stream Pollution Control Board against United States Steel Corporation. The appellee owns and operates an integrated steel manufacturing facility along the banks of the Grand Calumet River and the shoreline of Lake Michigan. In the processes of manufacturing steel, it uses great quantities of water from Lake Michigan. Appellee discharges its waste water back into the river. The appellant is an administrative board charged with the responsibility of controlling the preventing the pollution of state waters with deleterious substances. The appellant conducted hearings to determine if U.S. Steel was discharging excessive quantities of impurities into the Grand Calumet River and Lake Michigan. The Board gave U.S. Steel notice of the hearing. The court found that the findings of fact made by the Board were insufficient to require U.S. Steel to install pollution abatement facilities. The evidence did not support the conclusion that the effluents discharged were violative of the Board's regulations. (Proctor-Florida)
W75-09240

COUNTY OF OCEAN V. STOCKHOLD (APPEAL BY LANDOWNERS FROM JUDGEMENT UPHOLDING COUNTY'S RIGHT TO CONDEMN PROPERTY FOR PURPOSE OF A DRAINAGE EASEMENT).
323 A2d 515 (N J App 1974).

Descriptors: *Eminent domain, *Condemnation, *Drainage systems, *Drainage programs, *Judicial decisions, Drainage, Drainage engineering, Ditches, Adjacent landowners, New Jersey, Governments, Water law, Social aspects, Public benefits, Public health, Local governments, Adjudication procedure, State governments, Water policy, Surface water runoff, Water management(Applied), Legal review, Legal aspects.

Defendent landowners appealed from a judgement of the Superior Court holding that the county has the authority to condemn a portion of landowner's property for a drainage easement. Defendents contend that since there are reasonable alternative drainage routes, the necessity of the present condemnation is questionable and therefore the County lacks authority. The Court held that the County has a responsibility to provide adequate drainage systems in order to protect the public from flood waters. The condemnation, sought by the County for a drainage easement was for this public purpose, and was not initiated primarily for benefit of private individuals. Since the requisite public purpose is evident the condemnation is valid. Appellants finally contend that the matter should have been determined in a plenary hearing. The court held that no hearing was required by the summary procedure application to the action. (Proctor-Florida)
W75-09241

WOODLAWN MEMORIAL PARK OF NASHVILLE, INC. V. L AND N RAILROAD CO., INC. (SUIT FOR DAMAGES CAUSED BY COLLECTION AND DIVERSION OF RAINWATER).
377 F Supp 932 (M D Tenn 1974).

Descriptors: *Tennessee, *Judicial decisions, *Surface runoff, *Adjacent land owners, *Legal aspects, Suburban areas, Subsurface drains, Land tenure, Water law, Federal jurisdiction, Floods, Drainage effects, Drainage, Drainage water, Rainfall-runoff relationships, Rain, Storm runoff, Runoff, Urban runoff, Floodwater, Land development, Repulsion(Legal aspects), Riddance(Legal aspects), Surface waters, Adjudication procedure.
Identifiers: Common enemy rule, Nuisance(Legal aspects), Water rights(Non-riparians).

Plaintiff corporate landowner sued the defendant corporation, owner of adjacent higher lands, for damages allegedly caused by the collection and diversion of rainfall on the defendant's property in such manner as to cause water to flow onto plaintiff's property in greater quantities and at a place other than normal drainage shed. The plaintiff contended that certain improvements made upon defendant's property constituted an interference with the natural drainage of surface water and as such was an actionable nuisance under Tennessee law. A Federal District Court ruled that the flooding of the plaintiff's land was not caused by the improvments made by the defendant and that any loss suffered by the plaintiff was caused by the increase in surface water due to commercial and industrial development of surrounding property and the inability of the plaintiff's underground drainage system to accommodate heavy and intense rainfall. Judgement was entered for the defendant. (Deckert-Florida)
W75-09242

PROGRESS IN WATERSHED DEVELOPMENT IN THE AWR BASINS AREA UNDER USDA PROGRAMS - SEPTEMBER 1974.
Soil Conservation Service, Wichita, Kans.
For primary bibliographic entry see Field 4D.
W75-09246

THE PEOPLE'S LAKE,
Save Lake Superior Association, Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-09247

REVIEW OF NPDES PERMITS.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09248

EFFLUENT GUIDELINES AND STANDARDS--GENERAL PROVISIONS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09249

CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATION GUIDELINES, STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09250

TEXTILE INDUSTRY POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09251

IRON AND STEEL POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09252

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09253

CEMENT MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09254

RUBBER PROCESSING POINT SOURCE CATEGORY--TIRE AND INNER TUBE PLANTS EMULSION CRUMB RUBBER, SOLUTION CRUMB RUBBER, AND LATEX RUBBER SUBCATEGORIES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09255

WATER POLLUTION CONTROL--CONSTRUCTION GRANTS FOR WASTE TREATMENT WORKS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-09256

BELLE FOURCHE DAM AND GLENDO DAM-RESERVOIR ROADWAY.
Hearing--Subcomm. on Water and Water Resources--Comm. on Interior and Insular Affairs, U.S. Senate, 93d Cong, 2d Sess, June 13, 1974. 132 p, 3 map, 2 illus, 4 photo, 2 chart.

Descriptors: *Construction, *Spillways, *Slopes, *Reclamation, *Roads, Reservoirs, Water resources, Water, Construction costs, Dams, *South Dakota, *Wyoming, Slope protection.
Identifiers: Congressional hearings.

Hearings were held on S.2403 and S.3223. The purpose of the former bill is to authorize the construction of a new and larger spillway and upstream slope protection at the existing Belle Fourche Dam, a feature of the Belle Fourche reclamation development in South Dakota. The purpose of the latter measure is to authorize the Secretary of the Interior to reconstruct a portion of road which was relocated as a part of the construction of the deteriorating Glendo Dam and Reservoir in Wyoming. The text of the bills, accompanying statements and relevant communications are included. (Gagliardi-Florida)
W75-09257

CIBOLO, TEXAS, AND FRYINGPAN-ARKANSAS, COLORADO, PROJECTS.
Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, U.S. Senate, 93d Cong, 2d Sess, July 18, 1974. 65 p, 2 tab.

Descriptors: *Legislation, *Water supply development, *Flood control, *Hydroelectric power, *Multiple-purpose reservoirs, *Texas, Federal government, *Colorado, Water resources development, Reservoir operation, Water conservation,

Wildlife conservation, Fish conservation, Water management(Applied), Water yield improvement, Water resources, Recreation, Dams, Flood protection, Reservoirs, Hydroelectric plants.
Identifiers: Congressional hearings, Dam effects, Energy crisis, Cibolo Project(Tex), Fryingpan-Arkansas Project(Colo).

Two bills were considered. The first, S.3568, authorizes the Secretary of the Interior to construct, operate, and maintain the Cibolo Project in Texas. The second, S.3740, amends the Act of August 16, 1962, authorizing construction, operation, and maintenance of the Fryingpan-Arkansas Project, Colorado, to provide for the incorporation of pumped storage hydroelectric facilities. Reported are the texts of the two bills, statements made at the hearings, and letters received from local, state, and federal officials. Discussion of the Cibolo Project was generally positive. Since this project would provide new municipal and industrial water supplies, flood control, conservation of fish and wildlife resources, and outdoor recreation, it was considered welcome and economically reasonable. The Fryingpan-Arkansas Project also met with favorable comment as an efficient and economical method for manufacturing hydroelectric power. (Fernandez-Florida)
W75-09258

COLLIER COUNTY WATER MANAGEMENT ORDINANCE.
Ordinance No. 74-50, Collier County, Florida, sec. 1 thru 2, December 1974. 28 p.

Descriptors: *Permits, *Water policy, *Water management(Applied), *Administrative agencies, *Florida, Local governments, State governments, Groundwater, Groundwater recharge, Surface waters, Water resources, Water shortage, Water supply, Water table, Aquifers, Water wells, Water law, Water levels.
Identifiers: *Florida Water Resources Act of 1972, State policy.

Collier County Ordinance Number 74-50 establishes Collier County water management policy to effect maximum beneficial use, development and conservation, of the water resources of the County. The Board of County Commissioners is given power to regulate all ground and surface water of the County as well as the construction, maintenance and operation of all water wells, dams, impoundments and works within Collier County. Further, the Commission has the power to establish, maintain, and control water levels in all bodies of water in Collier County, and to regulate and control discharges into or withdrawn from Collier County waters. Article II requires the acquisition of permits for diversion of water, construction or alteration of dams or impoundments, artificial recharge of acquifiers, discharges of waste, and any interference with project works of the county. Standards are provided for the issuance of permits, permits for existing uses, and competing applications. (Denvir-Florida)
W75-09260

STATE OF OREGON NAVIGABLE WATER QUALITY STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-09261

OIL POLLUTION ACT AMENDMENTS OF 1973.
For primary bibliographic entry see Field 5G.
W75-09264

THE LAKE DILEMMA,
M. T. Arceneaux.
Louisiana Law Review, Vol 35, No 1, p 199-205, 1974. 40 ref.

Descriptors: *Bodies of water, *Banks, *Classification, *Accretion(Legal aspects), *Ownership of beds, Legal aspects, Judicial decisions, Water law, Streams, Running waters, Lakes, Navigable waters, High water mark, Low water mark, Riparian rights, Streambeds, Beds under water, Boundaries(Property), Lake beds, Riparian land, Louisiana.
Identifiers: Reliction, Equal footing doctrine.

Discussed is a recent decision of the Supreme Court of Louisiana which renovated the test for determining the legal classification of bodies of water. Classification of a body of water as a stream gives ownership of its bank to the riparian owners, while labelling the body a lake vests ownership up to the high-water mark in the state. The history of decisions in this area is traced by discussing the approaches utilized by the court in determining ownership of beds and categorization of bodies of water. A 'vast expanse' test, which was the prevailing rule, has been abandoned in favor of a broader 'multifactor test'. The multifactor test is a more realistic approach to the problem of waterbody classification because it allows determination based upon a balancing of facts rather than on a stringent judicial standard. It is concluded that this approach is sound from both legal and practical standpoints. (Fernandez-Florida)
W75-09265

PUBLIC RIGHTS IN GEORGIA'S TIDELANDS,
Georgia Univ., Athens. Inst. of Government.
J. Owens Smith, and J. L. Sammons.
Georgia Law Review, Vol 9, No 1, p 79-114, 1974. OSG 1-36009 and 04-3-158-6.

Descriptors: *Public rights, *Coastal marshes, *Water law, Coasts, Intertidal areas, Tides, Boundaries(Property), Legal aspects, Common law, *Georgia.
Identifiers: *Tidelands, *Public trust doctrine, Private property.

The importance of coastal marshlands and other intertidal areas to both commercial and environmental interests precludes application of traditional concepts of private property ownership to their use. Although the necessity for state regulation has been established and to some extent implemented, the theoretical basis for such regulation is highly determinative of its effectiveness in protecting the interests of the public. The evolution of the public trust doctrine is traced. Proper interpretation of Georgia law in this area requires that the role of the state be controlled by the public trust doctrine. (NOAA)
W75-09281

FEDERAL PLAN FOR ENVIRONMENTAL DATA BUOYS.
National Oceanic and Atmospheric Administration, Rockville, Md. Federal Coordinator for Marine Environmental Prediction.
For primary bibliographic entry see Field 7A.
W75-09282

STATE FINANCIAL ASSITANCE OF FLOOD CONTROL PROJECTS.
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6B.
W75-09301

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION: SANTA CLARA RIVER AND SESPE CREEK, FILLMORE, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09084

SPECIAL FLOOD HAZARD INFORMATION REPORT: ATLANTA, GEORGIA, INCLUDING PEACHTREE CREEK BASIN IN DEKALB COUNTY.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-09085

FLOOD PLAIN INFORMATION: EAST FORK BIG WOOD RIVER, GIMLET TRIUMPH, IDAHO.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09086

FLOOD PLAIN INFORMATION: PORTNEUF RIVER, INKOM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09087

FLOOD PLAIN INFORMATION: OROFINO CREEK-WHISKEY CREEK, OROFINO, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09088

SPECIAL FLOOD HAZARD INFORMATION: SOUTH FORK PALOUSE RIVER, MOSCOW, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09089

FLOOD PLAIN INFORMATION: THREE MILE CREEK, LEAVENWORTH, KANSAS.
Army Engineer District, Kansas City, Kans.
For primary bibliographic entry see Field 4A.
W75-09090

FLOOD PLAIN INFORMATION--MECHUMS RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-09091

FLOOD PLAIN INFORMATION: DEEP RIVER, TURKEY CREEK, DUCK CREEK, LAKE COUNTY, INDIANA.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-09092

POLICY ALTERNATIVES IN FLOOD PLAINS.
East Central Florida Regional Planning Council, Winter Park.
Preliminary Report ECFRPC 74-8, July 1974. 103 p, 5 fig, 5 tab, 16 ref, 2 append. CPA-FL-04-29-1040.

Descriptors: *Alternative planning, Water policy, *Flood plain insurance, *Flood plain zoning, *Non-structural alternatives, *Tidal water, Legal aspects, Building codes, Condemnation, Easements, Legislation, Flood protection, Flood forcasting, *Florida, Hurricanes.
Identifiers: *National Flood Disaster Protection Act of 1973, 100-year floods, Beach and Shore Preservation Act.

In east central Florida the last 14 years have been without the normal heavy rains, hurricanes, and floods. Consequently, rapid urbanization has encroached on flood prone land on the coast and along rivers and lakes. This guide examines federal, state, and local legislation and policies available to minimize flood damage through nonstructural alternatives. Guidelines and examples of necessary ordinances and forms are presented.

Major federal legislation includes the National Flood Disaster Protection Act of 1973 written to help flood victims and to discourage investment in vulnerable improvements. Federally subsidized flood insurance, required for mortgages on affected properties, is available to residents of communities which undertake floodplain land use controls. Of the 48 east central Florida communities designated as flood prone (20 on the coast), 18 (including 15 on the coast) qualified for this insurance by August, 1974. State action includes the Beach and Shore Preservation Act, the Flood Water Resources Act of 1972, and the establishment of the Coastal Coordinating Council. Local officials have a range of flood protection tools available including flood plain zoning, subdivision regulations, building codes, transfers of development rights, land acquisition, tax incentives, and 8 others which are described. (Herr-North Carolina)
W75-09094

FLOOD PLAIN INFORMATION: SANTA ANA RIVER (IMPERIAL HIGHWAY TO PRADO DAM), ORANGE AND RIVERSIDE COUNTIES, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09096

FLOOD PLAIN INFORMATION--COASTAL FLOODING, PORTSMOUTH, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-09097

FLOOD PLAIN INFORMATION: POMPESTON CREEK BURLINGTON COUNTY, NEW JERSEY.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09099

FLOOD PLAIN INFORMATION: ANIMAS RIVER AND TRIBUTARIES, DURANGO, COLORADO.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W75-09100

FLOOD PLAIN INFORMATION: VICINITY OF AUSTELL, GEORGIA, SWEETWATER CREEK.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-09101

FLOOD PLAIN INFORMATION: WARM SPRINGS CREEK, KETCHUM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09102

FLOOD PLAIN INFORMATION: LOYALSOCK CREEK, LYCOMING COUNTY, PENNSYLVANIA.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-09104

FLOOD PLAIN INFORMATION, PIGEON RIVER, CLINTONVILLE, WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-09108

FLOOD PLAIN INFORMATION: TURKEY CREEK, METROPOLITAN KANSAS CITY.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09109

FLOOD PLAIN INFORMATION: BIG WOOD RIVER, BELLEVUE-HAILEY, IDAHO AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09110

FLOOD PLAIN INFORMATION: LOWER SANTIAGO CREEK, ORANGE COUNTY, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09111

FLOOD PLAIN INFORMATION, MULBERRY CREEK, DRY CREEK, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09112

FLOOD PLAIN INFORMATION: SMOKY HILL RIVER, SALINE RIVER, DRY CREEK DIVERSION, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09113

FLOOD PLAIN INFORMATION, KANSAS AND BIG BLUE RIVERS, MANHATTAN, KANSAS.
Army Engineer District, Kansas City, Kans.
For primary bibliographic entry see Field 4A.
W75-09114

FLOOD PLAIN INFORMATION: PLUM CREEK, CUYAHOGA AND LORAIN COUNTIES, OHIO.
Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 4A.
W75-09116

FLOOD PLAIN INFORMATION: NUECES RIVER AND TURKEY CREEK, CRYSTAL CITY, TEXAS.
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 4A.
W75-09117

FLOOD PLAIN INFORMATION: SMITH CREEK - CLIFTON FORGE AND ALLEGHANY COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-09118

FLOOD PLAIN INFORMATION: REPUBLICAN RIVER, FRANKLIN, NEBRASKA.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09119

FLOOD PLAIN INFORMATION: MILL CREEK, NEW CASTLE COUNTY, DELAWARE.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09120

FLOOD PLAIN INFORMATION: ANTIETAM CREEK, WASHINGTON COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-09121

6G. Ecologic Impact Of Water Development

THE ENVIRONMENT OF OFFSHORE AND ESTUARINE ALABAMA,
Geological Survey of Alabama, University. Environmental Div.
For primary bibliographic entry see Field 2L.
W75-08961

STUDIES IN ENVIRONMENT - VOLUME I-SUMMARY REPORT,
Homer Hoyt Inst., Washington, D.C.
M. Selden, and L. G. Llewellyn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 786, $5.25 in paper copy, $2.25 in paper copy. Environmental Protection Agency, Report EPA-600/5-73-012a, December 1973. 112 p, 1 tab, 675 ref. Program Element 1 HA098. 801473.

Descriptors: *Environment, Measurement, Indicators, *Social values, Industrial wastes, Municipal wastes, *Legislation, *Management, *Recreation, Governmental interrelations, Air pollution, Water pollution, *Environmental effects.

Twenty-five students who participated as EPA summer fellows were selected from among 800 applicants responding to a national recruitment program. The students majored in a wide range of environmentally related studies on university and college campuses across the U.S. Select research topics were undertaken to bring fresh, hopefully unbiased, viewpoints on existing environmental problems in the anticipation that contributions would suggest new avenues for the development of current long-range environmental strategy. The students, composing 5 investigative teams, concentrated their efforts on: a possible approach toward quantifying the concept 'quality-of-life'; development of an accounting system for allocating pollution produced by industry as a result of consumer demands for goods and the environment; investigating the realm of environmental management; and lastly, how the generation of pollution differs as a characteristic of a community's location within large metropolitan areas. This volume, the first in a series, presents a synopsis of the full length reports published as separate reports. The other reports are: (Vol. 2) Quality of Life; (Vol. 3) Pollution and the Municipality; (Vol. 4) Consumption Differentials and the Environment; (Vol. 5) Outdoor Recreation and the Environment; (Vol. 6) Environmental Management. (See W75-09054 thru W75-09057) (EPA)
W75-09053

STUDIES IN ENVIRONMENT - VOLUME II - QUALITY OF LIFE,
Homer Hoyt Inst., Washington, D.C.
K. Hornback, J. Guttman, H. Himmelstein, A. Rappaport, and R. Reyna.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 787, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-600/5-73-012b, February 1974. 112 p, 2 fig. 801473.

Descriptors: Social aspects, Economic impact, Indicators, Measurement, Environment, Social values, Environmental effects, Water pollution, Air pollution.
Identifiers: Quality of life, Social indicators.

The concept of the Quality of Life (QOL) is investigated and a development methodology for constructing a measurement scheme to assess the QOL is presented. A brief synopsis is given of research done to data including various guidelines and rationale used in attempting to develop a meaningful social indicator for the QOL, and the current state-of-the-art and the research concerning attempts to adequately define and assess

Quality of Life. Also discussed is the functional relationship between objective and subjective conditions used as a theoretical framework to measure QOL and develop a Quality of Life Index. A rationale for the statistical treatment employed for the various parameters is set forth stressing the importance of the relationship between what actually exists and group perception of it. QOL factors are presented encompassing Economic, Social, Political, Health, Physical and Natural Environmental Sectors. Each of these factor lists is divided into subfactors and encompasses such things as income distribution, family, electoral participation, nutrition, housing and air. Objective measures, where they exist, are given for each subfactor, although they are merely examples and by no means an exhaustive listing. Analytical dimensions of a Quality of Life Index (QOLI) and the potential uses and misuses of such an Index are discussed. (See also W75-09053) (Gerba-EPA)
W75-09054

STUDIES IN ENVIRONMENT - VOLUME III, POLLUTION AND THE MUNICIPALITY,
Homer Hoyt Inst., Washington, D.C.
P. C. Cooper, S. J. Kursh, J. R. Wakeland, M. Van Winkle, and M. Zoller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 788, $5.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-600/5-73-012c, February 1974. 108 p, 23 tab. EPA Program Element 1HA098. Grant 801473.

Descriptors: Water pollution, Air pollution, *Standards, *Pollutants, Municipal wastes, *Cities, *Urbanization, Environment, Suburban areas, Regulation, *Environmental effects, Legislation, *Law enforcement.

Recent studies have focused attention on the fact that residents of inner-city neighborhoods are subject to greater amounts of pollutants than are other neighborhoods of large cities. In this study, the premise is set forth and investigated at the metropolitan scale, seeking to discover differences of impact between the center city and its suburbs. Differentials of a generalized metropolitan area are hypothesized, by pollutant types, by interpreting diverse information sources. The findings were looked at in the light of standards imposed by federal and state regulation, first uniformly enforced, then implications for variable enforcement. (See also W75-09053) (Gerba-EPA)
W75-09055

STUDIES IN ENVIRONMENT - VOLUME IV - CONSUMPTION DIFFERENTIALS AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
M. B. Olsen, E. Bickelhaupt, D. Grimsley, C. Lewis, and P. Scott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 789, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-600/5-73-012d, February 1974. 45 p, 4 tab. 801473.

Descriptors: *Input-output analysis, Air pollution Water pollution, Behavior, Model studies, Environment, *Mathematical models, Consumptive use, *Pollutants, *Attitudes, *Social change, Demands, Industrial wastes, *Environmental effects.
Identifiers: Consumer pollution, Comsumption models.

Pollution is a direct reflection of the behavioral patterns of the consuming public. In order to achieve long lasting positive reductions of pollutants, basic attitudinal changes must be effected toward what goods and services are demanded, in what quantities, as well as attitudes toward usage and disposal of these items. Through the use of mathematical model, both direct and indirect industrial pollution generated by fluctuations of the entire economy are tied to behavioral patterns of the consuming public. The model studies consumer behavior patterns from three viewpoints: income of family, age of head of family, and regional location of family within the United States. The methodology relates 126 final consumption industry groupings to 48 consumer item (product) groupings of the National Conference Board's taxonomy. The methodology employs the Resources for the Future's 'National Pollution Model', basically an input-output plus residual technique. Findings focus on most polluting industries, and the pollution associated characteristics of subgroups of the U.S. population. (See also W75-09053) (Gerba-EPA)
W75-09056

STUDIES IN ENVIRONMENT - VOLUME V - OUTDOOR RECREATION AND THE ENVIRONMENT,
Homer Hoyt Inst., Washington, D.C.
B. Kimmelman, K. Bildstein, P. Bujak, W. Horton, and M. Savina.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 790, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-600/5-73-012e, February 1974. 91 p, 19 tab. 801473.

Descriptors: Recreation, Environment, *Recreation demand, *Social mobility, *Social participation, *Environmental effects, Social needs, Recreation facilities, National parks, *Forecasting, Water pollution, Air pollution.
Identifiers: *Leisure activities.

Increases in discretionary time (time free from 'earning a living') over the past number of years have dramatically increased the pursuit of leisure activities. Reductions in the length of the work week, increases in paid holidays, longer vacations, and early retirement all foster increases in leisure activities, as do the rise in personal disposable income and higher levels of educational attainment. Add to these factors the increase in mobility, and the resulting boom in recreation is almost obvious. The increasing tendency toward recreational activity has notably placed a heavy demand on existing facilities and has also created a shortage of recreational facilities during peak vacation periods. This potential strain on the ecological carrying capacity of recreational areas is an ever-increasing environmental concern. This study focuses on the problems and potentials between outdoor recreation and the environment. The areas studied include recreation on private land, along coastal areas, national parks and urban areas. All of the factors contributing to recreational demand--leisure time, education, disposable income, population growth and mobility--are forecasting to increase and will result in increased participation in recreational activities. (See also W75-09053) (EPA)
W75-09057

DELAWARE RIVER BASIN COMMISSION ANNUAL REPORT, 1974.
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 6E.
W75-09093

ENVIRONMENTAL SYSTEMS APPRAISALS AND DEVELOPMENT GUIDES.
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W75-09107

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 4A.
W75-09122

ECOLOGICAL STUDIES OF TWO SWAMP WATERSHEDS IN NORTHEASTERN NORTH CAROLINA - A PRECHANNELIZATION STUDY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09130

BIOLOGICAL VIEW OF PROBLEMS OF URBAN HEALTH,
John Curtin School of Medical Research, Canberra (Australia). Dept. of Human Biology.
S. Boyden.
Hum Biol Oceania, Vol 1, No 3, p 159-169, 1972.

Descriptors: *Public health, Diseases, Urbanization, *Environmental effects, *Biology, Cities.

The pattern of health and disease in any community of animals, including mankind, is determined by the quality of the total environment. Disease patterns are changing and approaches to the problem of public health may be outdated and inappropriate today. Although severe forms of phylogenetic maladjustment, such as neoplastic disease and injury through motor accidents will undoubtedly continue to be a cause for concern, the main health problem will lie in the universality of relatively mild subthreshold conditions. The new components of the environment are so numerous and varied that it will be very difficult to identify the causes of chronic and low grade illnesses resulting from these changes. The insights provided by the study of human biology can contribute substantially to an understanding of society's attempts to overcome these difficulties. Since health depends on the quality of the total environment, a broadly based integrative approach in education, research and administration will be absolutely essential, involving the active cooperation of the representatives of many different academic disciplines.--Copyright 1973, Biological Abstracts, Inc.
W75-09332

7. RESOURCES DATA

7A. Network Design

USE OF SYSTEM ANALYSIS APPROACH IN THE HYDROLOGICAL PROJECTS OF THE WORLD METEOROLOGICAL ORGANIZATION,
World Meteorological Organization, Geneva (Switzerland). Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2A.
W75-09212

SYSTEM EVALUATION - RELIABILITY OF DATA AND EXTRAPOLATION AND CORRELATION OF DATA,
Utah Water Research Lab., Logan.
R. W. Jeppson.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 78-105. 5 fig, 4 tab, 9 ref.

Descriptors: *Reliability, *Correlation analysis, *Hydrologic data, *Measurement, Digital computers, Statistical methods, Mathematical studies, *Evaluation, Systems analysis, Data processing, Evaporation, Least squares method, Analytical techniques.
Identifiers: *Extrapolation, *Orthogonal least squares method, Multivariate analysis, Analysis of variance.

System evaluation was interpreted as defining the natural system through judicious analyses and in-

terpretation of available hydrologic data. Since the description of a hydrologic system includes the interactions of many variables and processes, whose magnitudes are subject to measurement and extrapolation errors, multivariate statistical methods are among the most useful tools available to hydrologists. Two-variate correlation and regression analyses were the first tools used in extending short records at one station by relating them to another station with longer records. With the advent of high speed digital computer, multiple correlation and regression analyses and statistical methods such as principal component analysis, autocorrelation, and spectral analysis of ten or more variables can easily and economically be obtained. Of a number of statistical parameters and tests available for ascertaining the significance of the regression fit, and multiple correlation coefficient and the coefficient of determination represent the most widely used parameters. Analysis of variance is used in conjunction with regression analysis to show contribution to the corrected sum of variance by each of the independent variables. (See also W75-09210) (Singh-ISWS)
W75-09215

PRELIMINARY REPORT ON WIND ERRORS ENCOUNTERED DURING AUTOMATIC PROCESSING OF IFYGL LORAN-C DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
J. Sullivan, and J. Matejceck.
Available from National Technical Information Service, U.S. Department of Commerce, Sills Building, 5385 Port Royal Road, Springfield, Va 22161. NOAA Technical Memorandum EDS CEDDA-4, May 1975. 9 p, 6 fig, 2 tab, 1 ref.

Descriptors: *Winds, *Data collections, *Instrumentation, *Lake Ontario, Computers, Atmospheric physics, Meteorology.
Identifiers: LORAN-C, *Rawinsondes, *Wind data, Upper air, Errors, Noise(Data).

Upper air winds were measured by tracking rawinsondes over Lake Ontario during the International Field Year for the Great Lakes. The rawinsonde time-delay data, from which winds were computed, contained four primary types of errors. The frequency of errors and the correction procedures are discussed. The most frequent source of error, noisy data presumably generated from sky-wave interference, was corrected entirely by automatic procedures. Also shown is the effect of correction procedures on vertical resolution of the wind data. (NOAA)
W75-09270

IFYGL PHYSICAL DATA COLLECTION SYSTEM: INTERCOMPARISON DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 7C.
W75-09271

IGOSS MARINE POLLUTION MONITORING PILOT PROJECT,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5A.
W75-09280

FEDERAL PLAN FOR ENVIRONMENTAL DATA BUOYS.
National Oceanic and Atmospheric Administration, Rockville, Md. Federal Coordinator for Marine Environmental Prediction.
Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402, for $1.00. Federal Plan for Environmental Data Buoys; Fiscal Year 1975, November 1974.

Descriptors: *Buoys, *Gaging stations, *Monitoring, *Control systems, *Data collections, *Instrumentation, Meteorological data, Climatic data, Weather data, Weather patterns, Forecasting, Programs, Planning, Warning systems, Oceanography, Oceans.
Identifiers: *Environmental data buoys, *Ocean monitoring, Federal plans, Ocean observations, Surface observations, Climate studies.

Buoys are supplying surface meteorological observations and limited surface and subsurface oceanographic data under all weather conditions. The environmental data buoy represents a ready technological opportunity to enhance ocean monitoring capability and make available additional information to support the rational development of the ocean and its resources. This plan represents a phased schedule for the deployment of 36 environmental data buoys. These include the purchase of new buoys and the retro-fitting of 6 existing deep ocean buoys with improved payload systems. Included are details of the technological development effort that will be pursued to achieve optimum capability and reliability of buoy systems and components. Three areas of buoy application are discussed: buoys for basic monitoring to monitoring to support climate studies and other scientific research, and buoy technology development. (NOAA)
W75-09282

7B. Data Acquisition

OXYGEN CONTENT AND B. O. D. OF EFFLUENTS MEASUREMENT.
For primary bibliographic entry see Field 5A.
W75-08851

FLOW PHOTOMETER (DURCHFLUSS-PHOTOMETER).
For primary bibliographic entry see Field 5A.
W75-08858

AUTONOMOUS, AUTOMATIC APPARATUS FOR WATER POLLUTION CONTROL (APPARECCHIO PER IL CONTROLLO AUTOMATICO DEGLI INQUINAMENTI DELL ACQUA CON AUTONOMIA DI FUNZIOAMENTO).
For primary bibliographic entry see Field 5A.
W75-08859

TWO NEW WATER MONITORS AVAILABLE.
For primary bibliographic entry see Field 5A.
W75-08887

WASTE WATER LEVEL MEASUREMENT.
For primary bibliographic entry see Field 5A.
W75-08896

INSTRUMENTATION FOR FILTRATION TESTS,
Coulter Electronics, Inc., Hialeah, Fla.
For primary bibliographic entry see Field 5A.
W75-08897

A STUDY TO EXPLORE THE USE OF ORBITAL REMOTE SENSING TO DETERMINE NATIVE ARID PLANT DISTRIBUTION,
Arizona Univ., Tuson. Office of Arid-Lands Studies.
W. G. McGinnies, E. F. Haase, L. K. Lepley, J. S. Conn, and H. B. Musick.
Final report, August, 1974, 36 p, 2 tab, append, 3 ref. NASA NAS5-21812.

Descriptors: *Remote sensing, *Desert plants, *Aerial photography, *Mapping, Vegetation, Arid lands, Arizona, Soils, Soil types.
Identifiers: *ERTS, Orbital imagery.

Results of research include a method for determining the reflectivities of natural areas from ERTS data taking into account sun angle and atmospheric effects on the radiance seen by the satellite sensor. Ground truth spectral signature data for various types of scenes, including ground with and without annuals, and various shrubs were collected. Large areas of varnished desert pavement are visible and mappable on ERTS and high altitude aircraft imagery. A large-scale and a small-scale vegetation pattern were found to be correlated with presence of desert pavement. A comparison of radiometric data with video-recordings shows quantitatively that for most areas of desert vegetation, soils are the most influential factor in determining the signature of a scene. Additive and subtractive image processing techniques were applied in the darkroom to enhance vegetation aspects of ERTS. (Mastic-Arizona)
W75-08945

USE OF STOCK PONDS FOR HYDROLOGIC RESEARCH ON SOUTHWEST RANGELANDS,
Agricultural Research Service, Tucson, Ariz. Southwest Rangeland Watershed Research Center.
J. R. Simanton, and H. B. Osborn.
In: Hydrology and Water Resources in Arizona and the Southwest, Proceedings of the 1973 meeting of the Arizona Section--American Water Resources Association, and the Hydrology Section--Arizona Academy of Science, p 2-7, (1973) 7 fig, 3 tab, 5 ref.

Descriptors: *Stock water, *Hydrologic data, *Runoff, *Rainfall-runoff relationships, *Small watersheds, Sedimentation, On-site data collection, Sediment yield, Ponds, Water holes, Instrumentation, Grazing, *Arizona, Range grasses.
Identifiers: Walnut Gulch Experimental Watershed(Ariz).

Five livestock watering ponds on the Walnut Gulch Experimental Watershed were instrumented to evaluate the use of these ponds as a method for comparing rainfall amounts with runoff sediment volumes. Pond drainage area, vegetative cover, soil type, percent slope, and years of record were tested. Instrumentation consisted of water level recorders, and a topographic survey of each stock pond to ascertain its storage capacity. The results to date have been insufficient to reach definite conclusions due to instrumentation and surveying problems, and because of the natural variability of thunderstorm rainfall. Since most of these problems have now been corrected, future data should yield valuable hydrologic data for semiarid rangelands by means of these instrumented stock ponds. (Mastic-Arizona)
W75-08946

ESTIMATION OF THE WATER RESOURCES OF A PORTION OF THE GAMBIER PLAIN SOUTH AUSTRALIA USING A NEW METHOD FOR EVALUATING LOCAL RECHARGE,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
For primary bibliographic entry see Field 2F.
W75-08953

THE OPACITY OF ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
For primary bibliographic entry see Field 2B.
W75-08974

A MEASUREMENT OF THE MIXING RATIO OF WATER VAPOUR FROM 15 TO 45 KM,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 2B.
W75-08976

USE OF REMOTE SENSING FOR MAPPING WETLANDS,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 2L.
W75-08977

CIVIL ENGINEERING APPLICATIONS OF REMOTE SENSING,
Missouri Univ., Rolla. Dept. of Geological Engineering.
D. J. Barr, and W. P. James.
Transportation Engineering Journal, American Society of Civil Engineers, Vol 101, No TE2, Proceedings Paper 11300, p 279-295, May 1975. 6 fig, 2 tab, 60 ref, 1 append.

Descriptors: *Remote sensing, *Aerial photography, *Civil engineering, *Water quality, Bibliographies, Environmental engineering, Sanitary engineering, Water resources, Transportation, Geology, Coastal engineering, Air pollution, Exploration, Flooding, Groundwater, Landfills, Soils, Instrumentation, Monitoring, Measurement, Sites.

An introduction to the concepts of remote sensing technology was presented. Remote sensor image interpretation was stressed as a practical tool for many civil engineering applications. The utility of remote sensing for use in the general areas of environmental and sanitary engineering, water resources, transportation engineering, geological engineering, and coastal engineering was described. References to publications dealing with specific remote sensing studies were keyed to general areas of application. The specific case of utilizing remote sensing for water quality studies was presented in detail. (Dawes-ISWS)
W75-08978

MEAN MERIDIONAL CIRCULATION IN THE SOUTHERN HEMISPHERE STRATOSPHERE BASED ON SATELLITE INFORMATION,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Sciences.
For primary bibliographic entry see Field 2B.
W75-08983

ELECTROMAGNETIC FLOW SENSORS,
Woods Hole Oceanographic Institution, Mass.
J. Kanwisher, and K. Lawson.
Limnology and Oceanography, Vol 20, No 2, p 174-182, March 1975. 6 fig, 8 ref. NSF Grant GA-31987.

Descriptors: *Flow meters, *Electronics, *Magnetic studies, *Currents(Water), Current meters, Ocean currents, Flow, Electromagnetic waves, Remote sensing.
Identifiers: *Sensors.

Flow sensors based on the principle of electromagnetic induction were investigated as alternatives to commonly used mechanical devices with rotors and propellers. Prototype sensors were constructed showing considerable promise. Measurement accuracy in excess of 1 cm/sec seems feasible with devices suited to long term battery operation. It was suggested that the inertial effects and many of the reliability problems inherent in moving part devices would be overcome by use of an electromagnetic sensor. (Bhowmik-ISWS)
W75-08987

ANALYSIS OF AN ELECTROMAGNETIC FLOW RATE TRANSDUCER,
Central Scientific Instruments Organization, Chandigarh (India).
A. K. Banerjee.
Indian Journal of Technology, Vol 12, No 7, p 281-284, July 1974. 2 fig, 10 ref.

Descriptors: *Flowmeters, *Electricity, *Mathematical studies, *Pipe flow, *Magnetic studies, Electronics, Flow rates, Theoretical analysis, Instrumentation.
Identifiers: *Electromagnetic flow rate transducer.

A mathematical analysis was made using tensor calculus to obtain detailed output expressions for an electromagnetic flow rate transducer in terms of flow and the externally influenced 'hum' voltages along with other parameters. An electromagnetic flow rate transducer was fabricated and various output parameters were measured. A comparison of the computed and measured parameters showed good agreement. (Bhowmik-ISWS)
W75-08989

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2J.
W75-08995

A SIMPLE AIRLIFT-OPERATED TANK FOR CLOSED-SYSTEM CULTURE OF DECAPOD CRUSTACEAN LARVAE AND OTHER SMALL AQUATIC ANIMALS,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
P. A. Sandifer, P. B. Zielinski, and W. E. Castro.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11452, $3.25 in paper copy, $2.25 in microfiche. Helgolander wissenschaftiche Meeresunters, Vol 26, p 82-87, 1974. 3 fig, 3 ref.

Descriptors: Design, *Aquaria, Technology, *Larval growth stages, *Aquiculture, *Crustaceans, Aquatic animals, Crustaceans.
Identifiers: *Macrobrachium, Decapod crustacea.

A rectangular tank for culture of decapod crustacean larvae with continuous water recirculation is described. The tank has a sloped bottom and an attached gravel filter unit. Water circulation through the filter serves at the same time for maintaining food particles in suspension and for dispersing the larvae; it is accomplished by airlift pumps. Tanks of this design have been successfully used for closed-system culture of the larvae of the prawn Macrobrachium rosenbergii and are expected to be satisfactory for other small aquatic animals. (Katz)
W75-09143

A FILTER AND CHILLER FOR AN OPEN SEA-WATER SYSTEM,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
W. F. Hettler, Jr.
The Progressive Fish-Culturist, Vol 36, No 4, p 234-238, October 1974. 2 fig, 2 ref.

Descriptors: *Design, *Equipment, *Temperature, *Sea water, Filtration, *Filters, Technology, Laboratory equipment, Pollutant identification, Instrumentation.
Identifiers: *Chillers.

A reliable filtration and chilling system for seawater pollution research and marine aquaculture is described. The filter system is constructed of nonmetallic materials and is designed to operate in parallel, to provide a large volume of water, or in series, to provide multiple filtration. The seawater chiller is able to chill seawater to the freezing point for experiments on temperature tolerance and metabolic responses of estuarine organisms. (Katz)
W75-09158

COMPUTERIZED RAIN ASSESSMENT AND TRACKING OF SOUTH FLORIDA WEATHER RADAR ECHOES,
National Oceanic and Atmospheric Administration, Coral Gables, Fla. Experimental Meteorology Lab.
For primary bibliographic entry see Field 2B.
W75-09208

HYDROLOGIC INSTRUMENTATION,
Utah Water Research Lab., Logan.
D. G. Chadwick.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan p 69-77. 6 fig.

Descriptors: *Instrumentation, *Telemetry, *Measurement, *Data transmission, Electronic equipment, Automatic control, Equipment, Manometers, Hydrologic data, Hydrology.
Identifiers: Actinometer, Microbarograph.

Described was a hydrologic instrumentation and telemetering system designed to incorporate desired precision, simplicity of design, and economical cost. The system is for unattended, remote use in mountainous terrain. It can operate for long periods without loss of accuracy. Specifically, a microbarograph, actinometer, and a manometer for measuring water content of snow have been developed. (See also W75-09210) (Jess-ISWS)
W75-09214

QUANTIZING 3- AND 5-CM RADAR HURRICANE PRECIPITATION DATA,
Miami Univ., Coral Gables, Fla. Remote Sensing Lab.
For primary bibliographic entry see Field 7C.
W75-09276

ENVIRONMENT MONITORING DEVICE AND SYSTEM,
Texas Instruments, Inc., Dallas. (Assignee).
For primary bibliographic entry see Field 5A.
W75-09305

7C. Evaluation, Processing and Publication

WATER RESOURCES INVENTORY OF CONNECTICUT--PART 5, LOWER HOUSATONIC RIVER BASIN,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 4A.
W75-08905

SUMMARY OF HYDROLOGIC DATA COLLECTED DURING 1973 IN DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. E. Hull, and D. J. McKenzie.
Open-file report 74029, 1974. 122 p, 43 fig, 8 tab, 12 ref.

Descriptors: *Basic data collections, *Groundwater, *Surface waters, *Florida, *Hydrologic data, Streamflow, Water levels, Saline water intrusion, Withdrawal.
Identifiers: Dade County(Fla), *Miami(Fla).

This report is eighth in a series documenting the annual hydrologic conditions in Dade County, Florida. The general hydrologic data in Dade County for the 1973 water year (October 1, 1972) to September 30, 1973) are summarized in tables, graphs, and maps. During the 1973 calendar year rainfall was 9.19 inches below the long-term average. Groundwater levels ranged from 0.3 foot above to 9.0 foot below average. In the 1973 water year, the combined average daily discharge from

seven major streams and canals that flow into Biscayne Bay was 1,120 cfs, 296 cfs below the combined average daily flow for the 1972 water year. The combined average daily flow through the Tamiami Canal outlets was 602 cfs, 80 cfs below that of the 1972 water year. The 1973 position of the salt front in the coastal part of the Biscayne aquifer was about the same as that in 1971 and 1972, except at Miami International Airport and Homestead Air Force Base where the salt front had encroached inland. (Knapp-USGS)
W75-08908

SUMMARY STATEMENTS OF WATER RESOURCES INVESTIGATIONS IN FLORIDA, 1974-75.
Geological Survey, Tallahassee, Fla.
Project Summaries Report, September 1974. 139 p.

Descriptors: *Water resources, *Investigations, *Florida, *Data collections, *Hydrologic data, Surveys, Water quality, Groundwater, Surface waters.

This report contains summary statements for water resources investigations by the U.S. Geological Survey in Florida during 1974-75. In Florida, water resources appraisals are highly diversified, ranging from hydrologic records networks to interpretative appraisals of water resources and applied research to develop investigative techniques. The interpretative reports, map, diagrams, and records that are products of the investigations are a principal hydrologic foundation upon which the plans and development of Florida's water resources may be based. (Knapp-USGS)
W75-08909

AVAILABILITY AND QUALITY OF GROUND WATER IN THE SUTHERLIN AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, Oreg.
J. H. Robison.
Water-Resources Investigations 32-74, 1974. 2 sheets, 16 ref.

Descriptors: *Groundwater, *Oregon, Hydrogeology, Aluvium, *Maps, Water yield, Water supply, Hydrologic data.
Identifiers: Sutherlin(Oreg), Douglas County(Oreg).

This 2-sheet map report presents information in a form that will enable water users, potential water users, and planners to estimate the likelihood of obtaining groundwater in adequate quantity and of suitable quality at desired locations in the Sutherlin area, Douglas County, southwestern Oregon. The city of Sutherlin obtains its municipal water supply from Cooper and Calapooya Creeks; Oakland also uses Calapooya Creek. The Umpqua Basin Water Association withdraws water from the North Umpqua River. The city of Roseburg serves the area south of Winchester with water obtained from the North Umpqua River. Water levels of wells range from slightly above land surface to as deep as 300 feet below land surface. Quantities of water obtainable from wells within the study area are not adequate for irrigation, municipal, nor large industrial use. (Knapp-USGS)
W75-08910

SOURCES OF EMERGENCY WATER SUPPLIES IN SAN MATEO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 6D.
W75-08911

RECONNAISSANCE OF THE WATER RESOURCES OF THE OKLAHOMA CITY QUADRANGLE, CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W75-08912

RECONNAISSANCE OF THE WATER RESOURCES OF THE OKLAHOMA CITY QUADRANGLE, CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
R. H. Bingham, and R. L. Moore.
Oklahoma Geological Survey Hydrologic Atlas 4, 1975. 4 sheets, 12 fig, 4 tab, 3 ref.

Descriptors: *Maps, *Hydrologic data, *Water resources, *Water quality, *Oklahoma, Hydrogeology, Groundwater resources, Surface waters, Rivers, Lakes, Ponds, Water supply, Water utilization, Chemical analysis, Aquifer characteristics, Surface-groundwater relationships, Precipitation(Atmospheric).
Identifiers: *Oklahoma City quadrangle.

This 4-sheet atlas describes the water resources of the Oklahoma City quadrangle which includes about 7,800 square miles in central Oklahoma. Most of the quadrangle is underlain by rocks of Pennsylvanian and Permian age. Approximately 1.5 to 3.5 inches of the annual precipitation is available to recharge the groundwater reservoir. Groundwater in most parts of the quadrangle is hard or very hard and locally contains sulfate and chloride in excess of 250 mg/litre. In some areas water from shallow wells contains more than 45 mg/litre nitrate, indicating possible pollution. In the western half of the quadrangle the terrace deposits yeild water of good quality, less than 500 mg/litre dissolved solids. The greatest potential sources of surface water include the Cimarron, North Canadian, Deep Fork, and Little Rivers and manmade ponds and lakes. The total amount of water used in 1970 is estimated at 50.7 billion gallons. Approximately 66% of this was taken from the lakes and rivers of the area; the remaining 17.4 billion gallons was provided from groundwater sources. The major use of water was for municipal purposes. (Woodard-USGS)
W75-08912

WATER RESOURCES OF WISCONSIN, LOWER WISCONSIN RIVER BASIN,
Geological Survey, Reston, Va.
S. M. Hindall, and R. G. Borman.
For sale by USGS, Reston Va 22092, $2.50 per set. Hydrologic Investigations Atlas HA-479, 1974. 3 sheets, 46 ref.

Descriptors: *Water resources, *Surface water availability, *Groundwater resources, *Water quality, *Wisconsin, River basin development, Hydrologic data, Water utilization, *Maps, Streamflow, Discharge(Water), Water wells, Water data, Aquifer characteristics, Water yield, Water supply, Surface-groundwater relationships.
Identifiers: *Lower Wisconsin River basin(Wisc).

This 3-sheet map report describes the physical environment, availability, characteristics, distribution, movement, and quality of water in the lower Wisconsin River basin. In addition, water use and water problems are summarized to aid in water management within the basin. The lower basin, as used in this report, has an area of approximately 3,780 square miles, 6.7 percent of the State, and consists of all or parts of 11 counties in southwestern Wisconsin. The 1970 population of the basin was estimated to be 133,000, a decrease of about 1,500 persons since 1960. The economy of the area is primarily agricultural. Dairy farming and beef production are of primary importance. Large amounts of good-quality water are available. Of the 32.1 inches of average annual precipitation that falls on the basin, 8.9 inches, an average of 2,200 billion gallons, leaves the basin as streamflow each year. This represents the amount of surface water available for use. More surface water is used than groundwater. Surface water is used for hydroelectric power generation (3,620 mgd), industrial and commercial (47.3 mgd), irrigation (0.1 mgd), waste transport, and recreation. Groundwater is used for all municipal supplies and most rural supplies (13.9 mgd), many industrial purposes (8.7 mgd), and irrigation (0.5 mgd). (Woodard-USGS)
W75-08913

WATER RESOURCES OF HAMILTON COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
D. H. Lobmeyer, and C. G. Sauer.
For sale by USGS, Reston, Va 22092 and Denver, Colo 80225 $1.50 per set. Hydrologic Investigations Atlas HA-516, 1974. 2 sheets, 11 ref.

Descriptors: *Water resources, *Surface water availability, *Groundwater resources, *Water quality, *Kansas, Hydrologic data, Water yield, Water utilization, Streamflow, Discharge(Water), Well data, Aquifer characteristics, Precipitation(Atmospheric), Groundwater recharge, Surface-groundwater relationships, *Maps, Geology, Hydrogeology.
Identifiers: *Hamilton County(Kans).

This 2-sheet atlas describes water resources of Hamilton County, Kansas. The average annual precipitation is about 16 inches. Of this amount, 83% occurs during the growing season (March 15 to October 15). The average groundwater recharge from precipitation is estimated to be 0.1 inch per year. In the upland area of the county, dryland farming and grazing are the predominant land uses. The Arkansas River supplies water for irrigation along the valley. Average annual diversion by the Alamo Canal is 1,430 acre-feet and 4,740 acre-feet by the Fort Aubrey Canal. The Frontier Ditch, which diverts water from the river west of the Kansas State line, returns an average of 3,960 acre-feet annual about 4 miles downstream from Coolidge. Groundwater in the unconsolidated Tertiary and Quaternary deposits in Hamilton County occurs in three general areas: (1) The upland area in the northern part of the county; (2) the valley of the Arkansas River; and (3) the area south of the Bear Creek fault. Outside of these areas, little water is available. In the valley of the Arkansas River, wells commonly yield more than 1,000 gpm. The dissolved-solids content of groundwater in most of the county ranges from 500 to 800 mg/litre. (Woodard-USGS)
W75-08914

GROUND WATER IN GRAY COUNTY, SOUTHWESTERN KANSAS,
Geological Survey, Reston, Va.
H. E. McGovern, and W. A. Long.
For sale by USGS, Denver, Colo 80225 and Reston, Va 22092, $1.50 per set. Hydrologic Investigations Atlas HA-517, 1974. 2 sheets, 14 ref.

Descriptors: *Groundwater resources, *Water quality, *Aquifer characteristics, *Kansas, Hydrogeology, Water wells, Water supply, Groundwater movement, Chemical analysis, Water yield, *Maps, Hydrologic data, Transmissivity, Hydraulic conductivity, Storage coefficient, Geology.
Identifiers: *Gray County(Kans).

This 2-sheet atlas describes the hydrogeology and chemical quality of groundwater in Gray County, Kansas. Unconsolidated deposits of Tertiary and Quaternary age form the principal aquifer. The water-yielding characteristics of the aquifer differ greatly from one area to another, and the groundwater may occur under unconfined or semiconfined conditions. Water having concentrations of dissolved solids less than 50 mg/litre is available in most of the county. Water having concentrations of 500 to 1,000 mg/litre occurs in an area north of the river valley in the western part of the county. In the Arkansas River Valley, concentrations of dissolved solids in water from the alluvium decrease from 1,600 mg/litre at the western county line to about 500 mg/litre at the eastern county line. In the same reach of the river valley, concentrations in water from the undifferentiated Pleistocene deposits decrease from 800 to about 200 mg/litre. Concentrations of more than 500 mg/litre of dissolved solids generally are as-

sociated with evapotranspiration from a shallow water table and with infiltration from applied irrigation water. (Woodard-USGS)
W75-08915

HYDROLOGIC UNIT MAP--1974, STATE OF MICHIGAN.
Geological Survey, Reston, Va.
For sale by USGS, Reston, Va 22092, Price $3.00 per set. Hydrologic Unit Map of Michigan, 1974. 2 sheets, 2 maps.

Descriptors: *Maps, *Hydrology, *Michigan, *Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Michigan that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Cataloging of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W75-08916

HYDROLOGIC UNIT MAP--1974, STATE OF SOUTH CAROLINA.
Geologic Survey, Reston, Va.
For sale by USGS, Reston, Va 22092, price $1.00. Hydrologic Unit Map of South Carolina, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *South Carolina, *Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in South Carolina that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information of Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W75-08917

HYDROLOGIC UNIT MAP--1974, STATE OF VIRGINIA.
Geological Survey, Reston, Va.
For sale by USGS, Reston, Va 22092, price $1.00. Hydrologic Unit Map of Virginia, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *Virginia, *Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Virginia that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W75-08918

HYDROLOGIC UNIT MAP--1974, STATE OF NEW YORK.
Geological Survey, Reston, Va.
For sale by USGS, Reston, Va 22092, price $1.25. Hydrologic Unit Map of State of New York, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *New York, *Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in New York State that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W75-08920

MODELLING A GROUNDWATER AQUIFER IN THE GRAND PRAIRIE OF ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W75-08923

THE APPLICATION OF THE DSDT HYBRID COMPUTER METHOD TO WATER RESOURCES PROBLEMS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 2F.
W75-08929

THE USE OF THE DIGITAL SIMULATION LANGUAGE PDEL IN HYDROLOGIC STUDIES,
California Univ., Los Angeles. Dept. of Computer Science.
For primary bibliographic entry see Field 2F.
W75-08930

INVESTIGATION OF SENSITIVITY AND ERROR PROPAGATION IN NUMERICAL MODELS OF GROUNDWATER BASINS,
James Cook Univ. of North Queensland, Townsville (Australia).
For primary bibliographic entry see Field 2F.
W75-08954

TECHNIQUES FOR HANDLING INPUT DATA FOR FINITE ELEMENT ANALYSIS OF REGIONAL GROUNDWATER FLOW,
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 2F.
W75-08955

VARIATIONS IN ESTIMATES OF DESIGN FLOODS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-08956

A NEW DEVELOPMENT IN FLOOD FREQUENCY ESTIMATION,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia).
For primary bibliographic entry see Field 2E.
W75-08957

COMPARISON OF UNIT HYDROGRAPH AND RUNOFF ROUTING METHODS OF FLOOD ESTIMATION,
Monash Univ., Clayton (Australia).
For primary bibliographic entry see Field 2E.
W75-08958

DEVELOPMENT OF REGIONAL FLOOD ESTIMATION PROCEDURES,
Cameron, McNamara and Partners, Brisbane (Australia).
For primary bibliographic entry see Field 4A.
W75-08959

A FLOW AND SALT TRANSPORT SIMULATION SYSTEM FOR THE RIVER MURRAY IN SOUTH AUSTRALIA,
South Australia Engineering and Water Supply Dept., Adelaide.
P. J. Manoel, and I. E. Laing.
In: Hydrology Symposium, Armidale, Australia, 1975. The Institution of Engineers Australia, Preprints of Papers, p 51 - 55, May 1975. 4 fig, 2 ref, append.

Descriptors: *Computer models, *River flow, *Salinity, Model studies, River forecasting, River regulation, Operations research, Planning, Water resources development, *Australia, Saline water, Data processing.
Identifiers: *Murray River(SA).

The salinity of the River Murray in South Australia has been recognised as an important constraint on the ultimate development of the river as a water resource. A computer model consisting of a flow model to compute river discharges and a salt transport model using the flow model to compute salinities is described, with examples of its use. The theoretical basis and evaluation of the parameters is explained for each of the component models, and the data processing system designed to support the model is outlined. The system allows the model to find application both in the real time operation of the river, in operations research and in planning for the use of the water resource. (CSIRO)
W75-08960

CURRENT SURGES IN THE ST. GEORGES CHANNEL,
Institute of Oceanographic Sciences, Birkenhead (England).
For primary bibliographic entry see Field 2L.
W75-08965

COMPARATIVE EVALUATION OF THREE URBAN RUNOFF MODELS,
Canada Centre for Inlands Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W75-08988

RBAD, RELATIVE BASAL AREA DETERMINATION, A FORTRAN PROGRAM TO DETERMINE BASAL AREA BY SPECIES AND PLOT FROM IBP STANDARD FORMAT FOREST SERVICE PLOT TAPES,
Oak Ridge National Lab., Tenn.
F. G. Goff.
Report EDFB-IBP 74-6, December 1974. 31 p, 4 ref, 3 append. NSF AG-199, 40-193-69.

Descriptors: *Computer programs, *Data processing, *Vegetation, *Distribution patterns, Data storage and retrieval, Information retrieval, Trees, Forests, Spatial distribution, Coniferous trees, Deciduous trees.

The purpose of this program is to summarize plot data from IBP standard format (i.e., reformatted) tree detail tapes obtained from the Forest Service. A deck of species code names and numbers is read by the program and used to label output. Output consists of: (1) a list of all species present on one or more of the plots that are read, with the number of plots on which each occurs; and (2) a table for each plot that shows the actual basal area (sq ft/acre) and relative basal area (percent) by species and size class (reproduction - stems less than 5.0 inches dbh; and tree - stems equal to or greater than 5.0 inches dbh). Species present on the plot are ranked in decreasing order of total (tree + reproduction) basal area. Appendixes included: (1) a Fortran listing of the main program and the subroutines; (2) a sample output; and (3) a listing of the Species Name Deck. (Humphreys-ISWS)
W75-08990

WATER QUALITY FEATURES OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-08991

UROS4: URBAN FLOOD SIMULATION MODEL PART 1. DOCUMENTATION AND USERS MANUAL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-09046

UROS4: URBAN FLOOD SIMULATION MODEL PART 2. APPLICATIONS TO SELECTED DEKALB COUNTY WATERSHEDS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-09047

A DISCRETE KERNEL GENERATOR FOR STREAM-AQUIFER STUDIES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W75-09078

FLOOD PLAIN INFORMATION: SANTA CLARA RIVER AND SESPE CREEK, FILLMORE, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09084

SPECIAL FLOOD HAZARD INFORMATION REPORT: ATLANTA, GEORGIA, INCLUDING PEACHTREE CREEK BASIN IN DEKALB COUNTY.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-09085

FLOOD PLAIN INFORMATION: EAST FORK BIG WOOD RIVER, GIMLET TRIUMPH, IDAHO.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09086

FLOOD PLAIN INFORMATION: PORTNEUF RIVER, INKOM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09087

FLOOD PLAIN INFORMATION: OROFINO CREEK-WHISKEY CREEK, OROFINO, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09088

SPECIAL FLOOD HAZARD INFORMATION: SOUTH FORK PALOUSE RIVER, MOSCOW, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09089

FLOOD PLAIN INFORMATION: THREE MILE CREEK, LEAVENWORTH, KANSAS.
Army Engineer District, Kansas City, Kans.
For primary bibliographic entry see Field 4A.
W75-09090

FLOOD PLAIN INFORMATION--MECHUMS RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-09091

FLOOD PLAIN INFORMATION: DEEP RIVER, TURKEY CREEK, DUCK CREEK, LAKE COUNTY, INDIANA.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-09092

FLOOD PLAIN INFORMATION: SANTA ANA RIVER (IMPERIAL HIGHWAY TO PRADO DAM), ORANGE AND RIVERSIDE COUNTIES, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09096

FLOOD PLAIN INFORMATION--COASTAL FLOODING, PORTSMOUTH, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-09097

FLOOD PLAIN INFORMATION: TOMS RIVER, UNION BRANCH, RIDGEWAY BRANCH AND LONG SWAMP CREEK, OCEAN COUNTY, NEW JERSEY,
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09098

FLOOD PLAIN INFORMATION: POMPESTON CREEK BURLINGTON COUNTY, NEW JERSEY.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09099

FLOOD PLAIN INFORMATION: ANIMAS RIVER AND TRIBUTARIES, DURANGO, COLORADO.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W75-09100

FLOOD PLAIN INFORMATION: VICINITY OF AUSTELL, GEORGIA, SWEETWATER CREEK.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-09101

FLOOD PLAIN INFORMATION: WARM SPRINGS CREEK, KETCHUM, IDAHO, AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09102

FLOOD PLAIN INFORMATION: LOYALSOCK CREEK, LYCOMING COUNTY, PENNSYLVANIA.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-09104

FLOOD PLAIN INFORMATION, PIGEON RIVER, CLINTONVILLE, WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-09108

FLOOD PLAIN INFORMATION: TURKEY CREEK, METROPOLITAN KANSAS CITY.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09109

FLOOD PLAIN INFORMATION: BIG WOOD RIVER, BELLEVUE-HAILEY, IDAHO AND VICINITY.
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-09110

FLOOD PLAIN INFORMATION: LOWER SANTIAGO CREEK, ORANGE COUNTY, CALIFORNIA.
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 4A.
W75-09111

FLOOD PLAIN INFORMATION, MULBERRY CREEK, DRY CREEK, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09112

FLOOD PLAIN INFORMATION: SMOKY HILL RIVER, SALINE RIVER, DRY CREEK DIVERSION, SALINA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09113

FLOOD PLAIN INFORMATION, KANSAS AND BIG BLUE RIVERS, MANHATTAN, KANSAS.
Army Engineer District, Kansas City, Kans.
For primary bibliographic entry see Field 4A.
W75-09114

FLOOD PLAIN INFORMATION: PLUM CREEK, CUYAHOGA AND LORAIN COUNTIES, OHIO.
Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 4A.
W75-09116

FLOOD PLAIN INFORMATION: NUECES RIVER AND TURKEY CREEK, CRYSTAL CITY, TEXAS.
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 4A.
W75-09117

FLOOD PLAIN INFORMATION: SMITH CREEK - CLIFTON FORGE AND ALLEGHANY COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.

W75-09118

FLOOD PLAIN INFORMATION: REPUBLICAN RIVER, FRANKLIN, NEBRASKA.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-09119

FLOOD PLAIN INFORMATION: MILL CREEK, NEW CASTLE COUNTY, DELAWARE.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-09120

FLOOD PLAIN INFORMATION: ANTIETAM CREEK, WASHINGTON COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-09121

COMPUTER ASSISTED DESIGN OF DIVERGING BRANCH FLUID NETWORK: A DYNAMIC PROGRAMMING APPROACH,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 8B.
W75-09124

MAP SHOWING DEPTH TO BEDROCK, PLAINFIELD QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
C. J. Londquist.
Miscellaneous Field Studies Map MF-664 A (Connecticut Valley Urban Area Project Environmental Geologic and Hydrologic Studies Contribution 139), 1975. 1 sheet, 1 map, 2 ref.

Descriptors: *Soil surveys, *Massachusetts, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks.
Identifiers: *Depth to bedrock, *Plainfield(Mass).

A map indicates depth to bedrock below land surface in the Plainfield quadrangle, Massachusetts. The locations of bedrock outcrops were obtained by field mapping and from a surficial geology map. Depths to bedrock are inferred from logs of wells and test holes and excavations for utility lines and foundations supplemented by data from a contour map of the bedrock surface. Depths shown are a generalization of localized highly variable conditions and do not include any weathered (decomposed) bedrock. (Woodard-USGS)
W75-09165

MAP SHOWING DEPTH TO BEDROCK, HEATH QUADRANGLE, MASSACHUSETTS-VERMONT,
Geological Survey, Boston, Mass.
C. J. Londquist.
Miscellaneous Field Studies Map MF-663 A (Connecticut Valley Urban Area Project Environmental Geologic and Hydrologic Studies Contribution 137), 1975. 1 sheet, 1 map, 2 ref.

Descriptors: *Soil surveys, *Massachusetts, *Vermont, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks.
Identifiers: *Depth to bedrock, *Heath quadrangle(Mass-Vt).

A map indicates depth to bedrock below land surface in the Heath quadrangle, Massachusetts-Vermont. The locations of bedrock outcrops were obtained by field mapping and from a surficial geology map. Depths to bedrock are inferred from logs of wells and test holes and excavations for utility lines and foundations supplemented by data from a contour map of the bedrock surface. Depths shown are a generalization of localized highly variable conditions and do not include any weathered (decomposed) bedrock. (Woodard-USGS)
W75-09166

CONTOUR MAP OF THE BEDROCK SURFACE, BRISTOL QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
E. H. Handman, and D. B. Meade.
Miscellaneous Field Studies Map MF-665 A (Connecticut Valley Urban Area Project Environmental Geologic and Hydrologic Studies Contribution 134), 1975. 1 sheet, 1 map, 3 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks.
Identifiers: *Bristol(Conn), *Bedrock surface map.

Contours show the altitude of the bedrock surface in the Bristol quadrangle, Connecticut. The position of the contours is based largely on data from wells, test holes, and published geologic maps supplemented by knowledge of the geologic history of the region. The map shows the configuration of the bedrock surface if all unconsolidated earth materials were removed. (Woodard-USGS)
W75-09167

CONTOUR MAP OF THE BEDROCK SURFACE, SOUTHINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
D. L. Mazzaferro.
Miscellaneous Field Studies Map MF-660 A (Connecticut Valley Urban Area Project Environmental Geologic and Hydrologic Studies Contribution 133), 1975. 1 sheet, 1 map, 4 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks.
Identifiers: *Southington(Conn), *Bedrock surface map.

Contours show the altitude of the bedrock surface in the Southington quadrangle, Connecticut. The position of the contours is based largely on data from wells, test holes, and published geologic maps supplemented by knowledge of the geologic history of the region. The map shows the configuration of the bedrock surface if all unconsolidated earth materials were removed. (Woodard-USGS)
W75-09168

WATER IN THE GREAT BASIN REGION; IDAHO, NEVADA, UTAH, AND WYOMING,
Geological Survey, Reston, Va.
D. Price, and T. E. Eakin.
For sale by U.S. Geological Survey, Reston, Va. 22092 - Price $2.25 per set. Hydrologic Investigations Atlas HA-487, 1974. 4 sheets, 82 ref.

Descriptors: *Hydrologic data, *Maps, *Great Basin, Idaho, Nevada, Utah, Wyoming, Great Salt Lake, Standing waters, Saline lakes, Playas, Mud flats, Precipitation(Atmospheric), Runoff, Water supply, Water yield, Hydrogeology, Groundwater resources, Water utilization, Water wells, Surface-groundwater relationships, Water quality, Hydrographs.

The Great Basin Region includes the drainage of the Great Basin physiographic section in Idaho, Nevada, Utah, and Wyoming. This 3-sheet atlas describes the hydrologic data (including a general appraisal) that were compiled for a comprehensive framework study completed in June 1971. The Great Basin Region has no surface drainage to the sea. Streams in the region end in lakes or in sinks, including playas, mudflats, and salt marshes. The largest terminal lakes or sinks, all of which are saline, include Great Salt Lake, Sevier Lake (usually dry), Walker Lake, Pyramid Lake, and Carson Sink. Altitudes in the region range from about 2,200 feet in the Amargosa Desert to more than 10,000 feet above mean sea level in the highest mountain ranges. The climate is arid to semiarid in the valleys and subhumid to humid in the mountains. The highest mountains in the east, west, and north-central parts of the region receive the largest amounts of precipitation and are the headwater areas for the principal river systems. The region is subdivided into six hydrologic subregions, largely on the basis of drainage, as follows: Bear River, Great Salt Lake, Sevier Lake, Humboldt, Central Lahontan, and Tonopah, for a total of 136,659 sq mi. (Woodard-USGS)
W75-09170

DIGITAL MODEL ANALYSIS OF THE PRINCIPAL ARTESIAN AQUIFER, GLYNN COUNTY, GEORGIA,
Geological Survey, Doraville, Ga.
R. E. Krause, and H. B. Counts.
Water-Resources Investigations 1-75 (open-file report), 1975, 4 sheet, 11 ref.

Descriptors: *Drawdown, *Water resources development, *Artesian aquifers, *Georgia, *Simulation analysis, Mathematical models, Withdrawal, Water levels, Groundwater.
Identifiers: *Glynn County(Geo).

A digital model is a useful tool for managing the groundwater supply from the principal artesian aquifer in the Glynn County area of Georgia. Computations may be extended in time, thus indicating what the water-level configuration is likely to be in the future, showing comparisons of different management alternatives. Groundwater users in the Brunswick area withdraw about 105 mgd of water from the aquifer. This high usage has caused some problems of water-level decline and deterioration of the water quality. Maps show both the measured and computed water-level contours for the Brunswick area in 1960 and 1970. Hydrographs show the measured water-level trend from 1940 to 1970 for four wells in the Brunswick area tapping the principal artesian aquifer, and also water-level trends for four hypothetical wells located in those nodes corresponding to the actual wells. The maps indicate good areal match of computed to actual water level, and the hydrographs show that the computed trend matches the trend of the measured water levels. The transient model was extended from 1970 to the year 2000. This projection assumes that the pumping rate for 1970-2000 will be the same rate as in the 1963-70 period, and that all other hydrologic parameters used in the model remain unchanged. The 2000 water level is virtually the same as for 1970. Any added discharge from the aquifer, however, will lower the water level, and by use of the transient model, this lowering and new water level may be calculated. (Knapp-USGS)
W75-09171

DISCHARGE MEASUREMENTS AND CHEMICAL ANALYSES OF WATER IN NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo.
E. R. Cox.
Wyoming Water Planning Report No 14 (Basic-Data Report), 1975. 20 p, 1 fig, 5 tab.

Descriptors: *Discharge(Water), *Chemical analysis, *National parks, *Wyoming, Surface waters, Groundwater, Basic data collections, Sampling, Sites, Hydrologic data, Water quality, Well data, Streamflow, Lakes.
Identifiers: *Yellowstone National Park(Wyo), Grand Teton National Park(Wyo).

Discharge measurements and water samples for chemical analysis were obtained from 1959 through 1972 in and near Yellowstone and Grand Teton National Parks as part of studies made in cooperation with the National Park Service. Data

were collected in areas outside the National Parks in 1973 in cooperation with the Wyoming State Engineer. The data are tabulated in five tables. A map shows location sites where samples were collected from 122 wells, 50 springs, 83 streams, and 6 lakes in about 5,500 square miles of northwestern Wyoming. The data supplement interpretive reports by the U.S. Geological Survey on water resources of the area. (Woodward-USGS)
W75-09172

FLOODS IN EAST BATON ROUGE PARISH AND ADJACENT AREAS, LOUISIANA, FOR THE PERIOD 1953-74,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 4A.
W75-09173

WATER RESOURCES DATA FOR KANSAS, 1974: PART 1. SURFACE WATER RECORDS.
Geological Survey, Lawrence, Kans.
Data Report, 1975. 202 p, 2 fig, 3 ref.

Descriptors: *Basic data collections, *Hydrologic data, *Kansas, Streamflow, Stage-discharge relations, Lakes, Reservoirs, Gaging stations.

Water resources data for the 1974 water year for Kansas including records of streamflow or reservoir storage at gaging stations, partial-record stations, and miscellaneous sites are given. Records are included for 163 gaging stations of which 143 are streamflow discharge stations and 20 are reservoir or lake stations; also are included records for 23 low-flow partial-record stations, 127 crest-stage partial-record stations, and 2 flood-hydrograph stations. Locations of gaging stations are shown. The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. The description of the gaging stations gives the location, drainage area, period of record, type and history of gages, average discharge, extremes of discharge or contents, general remarks, and notations of revisions of previously published records. (See also W75-09181) (Knapp-USGS)
W75-09180

WATER RESOURCES DATA FOR KANSAS, 1974: PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
Data Report, 1974. 188 p, 2 fig, 5 tab, 25 ref.

Descriptors: *Water quality, *Chemical analysis, *Kansas, Surface waters, Groundwater, Physical properties, Sediment transport, Inorganic compounds, Biological properties, Water temperature, Sampling, Sites, Data collections, Hydrologic data.

Water-resources data for the 1974 water year for Kansas include records of data for the chemical and physical characteristics of surface and groundwater. Data on the quality of surface water (chemical, biological, temperature, and sediment) were collected from designated sampling sites once daily, weekly, monthly, or less frequently, and at some sites data were recorded on punched paper tape at 60-minute intervals. Records are given for 69 sampling stations. Miscellaneous temperatures of streamflow are given for 82 gaging stations, and records of chemical analyses are given for 219 groundwater sites. Locations of the sampling stations are shown. Records for pertinent water-quality stations in bordering States are also included. (See also W75-09180) (Woodard-USGS)
W75-09181

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE TEHAMA-COLUSA CANAL SERVICE AREA, SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-09187

SIMULATION MODEL FOR EVAPOTRANSPIRATION OF WHEAT: EFFECT OF EVAPORATIVE CONDITIONS,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 2D.
W75-09196

SYSTEMS ANALYSIS OF HYDROLOGIC PROBLEMS.
For primary bibliographic entry see Field 2A.
W75-09210

SYSTEM EVALUATION - RELIABILITY OF DATA AND EXTRAPOLATION AND CORRELATION OF DATA,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 7A.
W75-09215

STOCHASTIC PROCESSES AND MODELS IN HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-09216

THE USE OF INPUT-OUTPUT (TRANSFER FUNCTION) MODELS IN HYDROLOGY,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2A.
W75-09219

COMPUTER SIMULATION OF WATER RESOURCE SYSTEMS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2A.
W75-09220

THE SYNTHESIS OF HYDROLOGIC SYSTEMS ON THE ANALOG AND HYBRID COMPUTERS,
City Univ., London (England).
W. J. Morris.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 275-301. 8 fig.

Descriptors: *Systems analysis, *Hybrid computers, *Analytical techniques, *Flood routing, *Infiltration rates, Digital computers, Analog computers, Mathematics, Reservoirs, Flow, Hydrologic systems.
Identifiers: *Circuit diagrams, Machine equations.

A hybrid computer combines the capabilities of both the digital and analog computers. The analog computer is a parallel device in that all operations are performed simultaneously, while the digital computer is a sequential device with all operations performed in series. The hybrid computer retains the speed advantage, man-machine capability (for changing parameters and verification studies), and instant display of results in grapical form on an oscilloscope or a plotter of the analog computer. It also takes advantage of the greater precision, dynamic range, and storage capability of the digital computer for arithmetical computations. Basic programming for analog computers comprises development of mathematical system equations, simple block diagrams, and machine equations. Solutions by the hybrid computer of flood routing through a reservoir and Horton's infiltration curve for a storm were presented. (See also W75-09210) (Singh-ISWS)
W75-09221

A PROBLEM ORIENTED LIBRARY FOR HYDROLOGY,
McMaster Univ., Hamilton (Ontario). Dept. of Civil Engineering and Engineering Mechanics.
A. A. Smith.
In: Systems Analysis of Hydrologic Problems; Proceedings of the Second International Seminar for Hydrology Professors, August 2-14, 1970, Utah State University, Logan, p 305-325. 13 fig, 1 append.

Descriptors: *Computer programs, *Hydrology, *Libraries, Digital computers, Open channel flow, Hydraulics, Fluid mechanics, Engineering.
Identifiers: *Problem-oriented language, *FORTRAN-HYDRO computational modules.

A problem-oriented library was described and compared with problem-oriented languages. Advantages and disadvantages of each were described. A specific problem was illustrated by FORTRAN-HYDRO and by the determination of a surface water profile in a natural channel. The basic internal structure of all computational modules or subroutines necessary to solve such problems were described. The standard documentation of a subroutine was described and an example was presented. (See also W75-09210) (Terstriep-ISWS)
W75-09222

STUDY ON A SIGNIFICANT PRECIPITATION EPISODE IN THE WESTERN UNITED STATES,
National Weather Service, Salt Lake City, Utah. Western Region.
For primary bibliographic entry see Field 2B.
W75-09267

PRELIMINARY REPORT ON WIND ERRORS ENCOUNTERED DURING AUTOMATIC PROCESSING OF IFYGL LORAN-C DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 7A.
W75-09270

IFYGL PHYSICAL DATA COLLECTION SYSTEM: INTERCOMPARISON DATA,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
J. Foreman.
Available from National Technical Information Service, Springfield, Va. 22161. NOAA Technical Memorandum EDS CEDDA-3, May 1975. 7 p, 16 tab, 1 ref.

Descriptors: *Data collections, *Instrumentation, *Lake Ontario, Wind velocity, Water temperature, Air temperature, Data processing, Buoys, Great Lakes, Meteorology.
Identifiers: *Physical Data Collection System, *Data intercomparison, *International Field Year for the Great Lakes.

During the International Field Year for the Great Lakes (IFYGL) 1972-73, 14 buoys and towers (equipped with automatic recording devices) were deployed in Lake Ontario as the major segment of the Physical Data Collection System (PDCS). Data from buoy intercomparisons before deployment indicate that measurements by the PDCS sensors were accurate. During the field year, the buoy system was compared with sensors aboard the U.S. S/V (survey vessel) Johnson, and the data obtained confirmed the reliability of the air- and water-temperature sensors. The wind-speed and wind-direction sensors apparently functioned properly throughout the field year, but the quality

of current speed, current direction, and dew-point data deteriorated after deployment. (NOAA)
W75-09271

MATHEMATICAL MODELING OF NEAR COASTAL CIRCULATION,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2L.
W75-09273

VARIATIONS IN THE HYDROGRAPHIC STRUCTURE OF PRINCE WILLIAM SOUND,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W75-09274

ENVIRONMENTAL STUDY OF THE MARINE ENVIRONMENT NEAR NOME, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W75-09275

QUANTIZING 3- AND 5-CM RADAR HURRICANE PRECIPITATION DATA,
Miami Univ., Coral Gables, Fla. Remote Sensing Lab.
H. V. Senn.
Final report, Dec. 1974. 18 p, 2 fig, 3 tab, 14 ref.

Descriptors: *Hurricanes, *Radar, *Data collections, *Weather patterns, Storms, Meteorology, Instrumentation, Wavelengths, Attenuation.
Identifiers: *Hurricane Ellen, *Data analysis, Precipitation patterns.

The radar video tape recording experiment in hurricane Ellen 1973 was continued by reading-out the data through the University of Miami IEC system onto conventional PPI scopes with seven levels of video. Equipment and data problems are detailed, and future plans to digitize and computer process the tape are outlines. (NOAA)
W75-09276

NEW YORK BIGHT PROJECT, WATER COLUMN SAMPLING CRUISES NO 6-8 OF THE NOAA SHIP FERREL, APRIL - JUNE 1974,
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine EcoSystems Analysis Program.
For primary bibliographic entry see Field 2L.
W75-09277

FEDERAL PLAN FOR ENVIRONMENTAL DATA BUOYS.
National Oceanic and Atmospheric Administration, Rockville, Md. Federal Coordinator for Marine Environmental Prediction.
For primary bibliographic entry see Field 7A.
W75-09282

COMPUTER PROGRAMS IN USE IN THE WATER QUALITY BRANCH, VOL 5, WATER QUALITY DATA: POWER SPECTRUM (HARMONIC) ANALYSES AND FREQUENCY,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
A. Demajo, and D. A. Green.
Report Series No 38, 24 p, 1974, 13 fig, 4 ref.

Descriptors: *Computer programs, *Water quality, Fourier analysis, Analytical techniques, Data collections.

Time and harmonic frequency analyses have been applied to detect cyclical components in water quality data. This application is explained through a series of examples using synthesized and real data. (Envir-Canada)
W75-09289

8. ENGINEERING WORKS

8A. Structures

CONSTRUCTION REQUIREMENTS AND COST ANALYSIS OF GRASSED BACKSLOPE TERRACE SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W75-08926

COMPUTER ASSISTED DESIGN OF DIVERGING BRANCH FLUID NETWORK: A DYNAMIC PROGRAMMING APPROACH,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 8B.
W75-09124

ECOLOGICAL STUDIES OF TWO SWAMP WATERSHEDS IN NORTHEASTERN NORTH CAROLINA - A PRECHANNELIZATION STUDY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-09130

WAVE INDUCED PRESSURES ON SUBMERGED PLATES,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
For primary bibliographic entry see Field 8B.
W75-09207

PREAUTHORIZATION PLANNING ACTIVITIES OF THE BUREAU OF RECLAMATION, THE CORPS OF ENGINEERS AND THE SOIL CONSERVATION SERVICE FOR FISCAL YEAR 1975.
For primary bibliographic entry see Field 4A.
W75-09244

POST AUTHORIZATION PROJECT ACTIVITIES ANNUAL STATUS REPORT - BUREAU OF RECLAMATION.
For primary bibliographic entry see Field 4A.
W75-09245

BELLE FOURCHE DAM AND GLENDO DAM-RESERVOIR ROADWAY.
For primary bibliographic entry see Field 6E.
W75-09257

CIBOLO, TEXAS, AND FRYINGPAN-ARKANSAS, COLORADO, PROJECTS.
For primary bibliographic entry see Field 6E.
W75-09258

8B. Hydraulics

EXPERIMENTAL STUDY OF INTERMITTENT PIPE FLOW USING PITOT-TUBE PROBES WITH HIGH FREQUENCY RESPONSE,
J. Meseth.
Archives of Mechanics, Vol 26, No 3, p 319-400, 1974. 9 fig, 5 ref.

Descriptors: *Pitot tubes, *Pressure, *Model studies, *Pressure measuring instruments, *Reynolds number, Measurement, Laminar flow, Turbulent flow, *Pipe flow.
Identifiers: *Flow velocity.

Special Pitot-tube probes have been designed to measure pressure fluctuations of water flow up to a frequency of 1 kHz. A model was presented to interpret experimental observations on intermittent pipe flow up to a Reynolds-number of about 20,000. Disturbances were introduced by injections of a thin water jet at the pipe entrance over a short period of time. This resulted in a turbulent slug of pipe flow, which increases with time. The result was intermittent flow in the pipe without significant change in mean flow velocity. Measurements were then taken in the regions where the laminar flow was followed by turbulent flow and vice versa. In such regions, fluctuations in velocity are significantly larger than in a developed turbulent pipe flow. (Prague-FIRL)
W75-08899

GROSS PARAMETER SOLUTIONS OF JETS AND PLUMES,
Chalmers Univ. of Technology, Goteborg (Sweden).
K. Cederwall.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY5, Proceedings Paper 11285, p 489-509, May 1975. 4 fig, 2 tab, 14 ref, 2 append.

Descriptors: *Jets, *Dimensional analysis, *Momentum equation, *Continuity equation, *Density, Equations, Submergence, Turbulent flow, Froude number, Diffusion, Stratification, Outlets, Entrainment, Hydraulics, Buoyancy, Water pollution, Discharge(Water), *Path of pollutants.
Identifiers: *Plumes.

Gross parameter solutions were developed for turbulent jets, plumes, and buoyant jets in stagnant, homogeneous, or linearly stratified environments. The results were presented in a form that facilitates comparisons of the effects of various assumptions that could be made concerning hydraulic conditions in a design situation. The solutions were obtained by use of dimensional analysis, geometric relations for jet trajectory, and conservation equations for mass and momentum. Mathematical point and line sources were used consistently. This simplified the procedures of normalizing and solving the governing equations, and also, presenting the results. (Adams-ISWS)
W75-08980

ENVIRONMENTAL ASPECTS--SACRAMENTO BANK PROTECTION,
Hydrologic Engineering Center, Davis, Calif. Water Resources Planning Branch.
For primary bibliographic entry see Field 4D.
W75-08981

ANALYSIS OF AN ELECTROMAGNETIC FLOW RATE TRANSDUCER,
Central Scientific Instruments Organization, Chandigarh (India).
For primary bibliographic entry see Field 7B.
W75-08989

COMPUTER ASSISTED DESIGN OF DIVERGING BRANCH FLUID NETWORK: A DYNAMIC PROGRAMMING APPROACH,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
K-P. Yang.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-243 133, $4.75 in paper copy, $2.25 in microfiche. Ms Thesis, December 1973. 85 p, 16 fig, 3 tab, 12 ref, 4 append. OWRT B-029-HI(1) and B-034-HI(1).

Descriptors: *Dynamic programming, *Pipelines, *Computer models, *Mathematical studies, Computer programs, Numerical analysis, Simulation analysis, Piping systems(Mechanical), Pipes, Distribution systems, Hydraulic design, Networks, Pipe flow, Conduits.
Identifiers: *Diverging branch networks.

The dynamic programming technique has been successfully applied previously in solving serial type fluid systems. This technique was expanded to application to nonserial diverging branch type fluid networks. An interactive computer program based on a more efficient optimization method was developed. Pressure loss between pipe segments due to change of conduit sizes was incorporated into the design. The computer program was discussed with flow charts and a sample run of the program was presented. Results from this example demonstrated that the dynamic programming method is applicable to the solution of diverging branch type fluid system problems. Appendixes contain the Fortran listing of the program and the program output for the sample run. (Sims-ISWS)
W75-09124

GENERALIZED NOMOGRAPHIC SOLUTION OF HOOGHOUDT EQUATIONS,
Public Power Corp., Athens (Greece). Hydroelectric Project Design Branch.
J. G. Sakkas.
Journal of the Irrigation and Drainage Division, Proceedings of American Society of Civil Engineers, Vol 101, No IR1, Proceedings Paper 11182, p 21-39, March 1975. 4 fig, 8 tab, 16 ref, 2 append.

Descriptors: *Drainage, *Drains, *Groundwater, *Water table, Dupuit-Forchheimer theory, Hydraulic conductivity, Rainfall, Irrigation water, Graphical analysis.
Identifiers: *Drain spacing, *Nomographs, Steady-state theory.

The equation of drain spacing developed by Hooghoudt has gained considerable popularity among drainage design engineers because it is sufficiently accurate and possesses a simple mathematical expression. The latter is due to the notion of equivalent depth which he introduced. On the contrary, the application of the equation is quite cumbersome, requiring a trial-and-error procedure. In recent years drainage design for unsteady flow conditions also utilized the notion of equivalent depth. To simplify the use of both the drain spacing and the equivalent depth equations, they were put into dimensionless form containing fewer independent variables. An array of values suffices for quick and inexpensive determination of the equivalent depth. Tables of dimensionless equivalent depth also were prepared. A unique dimensionless nomographic solution of the drain spacing equation was obtained and was displayed in a set of five graphs. Work relevant to Hooghoudt equations by two investigators was analyzed with the aid of this analysis. (Schicht-ISWS)
W75-09197

SOLUTIONS FOR UNCONFINED NON-DARCY SEEPAGE,
James Cook Univ. of North Queensland, Townsville (Australia). Dept. of Engineering.
For primary bibliographic entry see Field 4A.
W75-09199

WAVE INDUCED PRESSURES ON SUBMERGED PLATES,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
W. W. Durgin, and J. C. Shiau.
Journal of the Waterways, Harbors and Coastal Engineering Division, Proceedings of American Society of Civil Engineers, Vol 101, No WW1, Proceedings Paper 11098, p 59-71, February 1975. 7 fig, 7 ref, 2 append.

Descriptors: *Waves(Water), *Hydrodynamics, *Model studies, *Intakes structures, Intakes, Coastal engineering, Velocity, Analysis, Laboratory tests, Pressure, Distribution, Hydraulic models.
Identifiers: *Wave forces, *Submerged intakes, Vortex sheet.

A submerged plate was assumed to be rigidly suspended at an arbitrary fixed depth. For analysis, the plate was replaced by a vortex sheet with strength which varied both temporally and spatially. The velocity potential of this vortex sheet was adjusted so that in combination with the velocity potential of the oncoming waves, the boundary conditions on the plate, the free surface, and the bottom were approximately satisfied. The final vortex strength distribution was determined and the velocity field and pressure distribution on each side of the plate were calculated. An experimental program was conducted in a 4 ft by 4 ft by 40 ft flume equipped with a wave generator of the piston type. A flat plate of sandwich construction was instrumented with small pressure transducers. The transducer outputs were processed and recorded on an oscillograph. Two plates, one 1.1 ft wide spanning the flume and one 1.1 ft wide octagon, were tested. Results of analytical and experimental investigations were presented as instantaneous differential pressure distributions for various wave positions as a wave progressed over the plate. (Adams-ISWS)
W75-09207

STUDIES OF THE BEHAVIOR OF HEAVY PARTICLES IN A TURBULENT FLUID FLOW,
Illinois Univ., Urbana. Nuclear Engineering Lab.
C. C. Meek, and B. G. Jones.
Journal of Atmospheric Sciences, Vol 30, No 2, p 239-244, March 1973. 3 fig, 1 tab, 13 ref. OWRT B-067-ILL(3). 14-31-0001-3582.

Descriptors: Sedimentation, Turbulent flow, Diffusion, *Flow, Dispersion, *Path of pollutants, Turbulence, Fluid mechanics.
Identifiers: *Particle dispersion, Particle suspensions.

A statistical analysis has been made of individual particle transport in a homogeneous, turbulent fluid flow. Expressions for dispersion, correlation coefficients, and turbulent energy content have been obtained. Two parameters were found to characterize particulate transport, one of which relates to inertial effects acting on the particle, while the other describes the effects of crossing trajectories. As in previous studies by others, crossing-trajectories effects are found to be of particular importance; inertial effects, however, even for heavy particles, are not insignificant. Comparison of theoretical predictions with experimental data shows good agreement.
W75-09237

LINEARIZED NON-STOKESIAN DRAG IN TURBULENT FLOW,
Illinois Univ., Urbana. Nuclear Engineering Lab.
B. G. Jones, R. J. Ostensen, and C. C. Meek.
Journal of the Engineering Mechanics Division, American Society of Civil Engineering, Technical Notes, Vol 99, No EM-1, Proc. Paper 9528, p 233-243, February 1973. 4 fig, 10 ref. OWRT A-019-ILL(3). 14-01-0001-1632.

Descriptors: *Turbulent flow, *Turbulence, *Path of pollutants, *Drag, Fluid mechanics, Analytical techniques, Reynolds number.
Identifiers: Drag coefficient, Non-stokesian drag, Particle free fall.

One of the vexing problems related to the analytical description of particle motion in a fluid medium is the departure from linearity of the viscous drag force acting on the particle as its Reynolds number is increased appreciably beyond unity. This nonlinear characteristic in many treatments is only approximately considered or neglected entirely. It is felt that the linearization of this nonlinear term will prove to be useful. An analytical technique is presented which retains both the effects of nonlinear viscous drag and the linear form of the dynamic equation. As an application of the theory, nonlinear viscous drag effects on the so-called response function of spherical particles suspended in a turbulent fluid field are considered.
W75-09238

8C. Hydraulic Machinery

AUTOMATIC PRIMING OF WASTE-WATER PUMP.
For primary bibliographic entry see Field 5D.
W75-08854

FIELD TESTING OF CENTRIFUGAL WASTE-WATER PUMPS,
Clinton Bogert Associates, Fort Lee, N.J.
For primary bibliographic entry see Field 5D.
W75-08892

DESIGN OF PRESSURE TRANSIENT CONTROL SYSTEM,
Edinburgh Univ. (Scotland). Dept. of Mechanical Engineering.
M. Driels.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY5, Proceedings Paper 11280, p 437-448, May 1975. 9 fig, 6 ref, 2 append.

Descriptors: *Water hammer, *Valves, *Mathematical models, *Control systems, *Hydraulic transients, Pipe flow, Analysis, Pressure, Laboratory tests, Design, Surges, Hydraulic equipment, Automation, Piping systems(Mechanical).
Identifiers: *Valve stroking, Control equipment.

A fast response electrohydraulic servo system operating on a closed-loop feedback control principle was described. A theoretical model of the control system was formulated which used an existing model of the fluid dynamics to investigate the performance and stability of the closed-loop system. Two methods of analyzing the servomechanism were described. The theoretical results for pressure and actuator motion were compared with experimental results obtained by using the servo system to implement valve stroking control methods. The theoretical model results predicted the actual response reasonably well. The mechanism performed the control function according to its design. (Adams-ISWS)
W75-08979

ANALYTICAL MODEL OF HYDRAULIC PIPELINE DREDGE,
Texas A and M Univ., College Station.
D. R. Basco.
Journal of the Waterways, Harbors and Coastal Engineering Division, Proceedings of American Society of Civil Engineers, Vol 101, No WW1, Proceedings Paper 11097, p 33-48, February 1975. 10 fig, 1 tab, 17 ref, 2 append.

Descriptors: *Dredging, *Performance, *Hydraulic transportation, *Hydraulic machinery, Model studies, Harbors, Estuaries, Sediment load, Pipelines, Pumps, Hydraulics, Analysis, Soil properties, Systems analysis, Engineering, Computer models, Mathematical models, Sediment transport.

Common dredging practice has been to estimate performance (solids output per unit time) by rules-of-thumb developed from experience. A typical hydraulic pipeline dredging system was described and pertinent variables were listed. Performance was shown to depend primarily on dredge configuration, dredging depth, pipeline length, and soils properties. A method for computing dredge performance, which incorporated basic engineering principles of fluid mechanics and sediment transport, was developed and demonstrated four

system factors (horsepower, cavitation, plugging velocity, and material dislodgement) which limit output were identified and examined. A model incorporating these factors was developed for computer computation of dredge system performance. (Adams-ISWS)
W75-09206

8D. Soil Mechanics

EARTH-DAM SEEPAGE AND RELATED LAND WATER PROBLEMS,
Dames and Moore, Phoenix, Ariz.
For primary bibliographic entry see Field 4A.
W75-08973

THE INFLUENCE OF LATE CENOZOIC STRATIGRAPHY ON DISTRIBUTION OF IMPOUNDMENT-RELATED SEISMICITY AT LAKE MEAD, NEVADA-ARIZONA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W75-09192

8F. Concrete

PRESSURE FILTER FOR WATER TREATMENT - FROM PRE-STRESSED CONCRETE RINGS WITH INTEGRAL FILTER PLANTS.
For primary bibliographic entry see Field 5D.
W75-09062

8G. Materials

CONTAMINATION OF WATER BY SYNTHETIC POLYMER TUBES,
Iowa State Univ., Ames. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-08894

RANDOM PLASTICS MEDIA ARE KEY TO HIGH-QUALITY EFFLUENT,
For primary bibliographic entry see Field 5D.
W75-09060

THE INFLUENCE OF LATE CENOZOIC STRATIGRAPHY ON DISTRIBUTION OF IMPOUNDMENT-RELATED SEISMICITY AT LAKE MEAD, NEVADA-ARIZONA,
Geological Survey, Denver, Colo.
R. E. Anderson, and R. L. Laney.
Journal available from Sup Doc, U.S. Gov't. Print. Off. 20402 for $3.15. Journal of Research of the US Geological Survey, Vol 3, No 3, p 337-343, May-June 1975. 4 fig, 18 ref.

Descriptors: *Seismic studies, *Lakes, *Lake beds, *Faults(Geologic), *Nevada, *Arizona, Cenozoic era, Hydrogeology, Structural geology, Geomorphology, Earthquakes, Reservoirs, Stratigraphy, Geologic units, Impounded water, Aquifer characteristics.
Identifiers: *Lake Mead(Nev-Ariz), Impounded water-earthquake relationships.

The impoundment of water in some reservoirs stimulates the release of seismic energy. At Lake Mead, Nevada-Arizona, contrasts in permeability of upper Cenozoic sediments show a better correlation with irregularly distributed impoundment-related seismicity than do contrasts in structure. An evaluation of structures developed during the late Cenozoic fails to explain the erratic distribution of seismicity. An evaluation of the late Cenozoic stratigraphy, however, shows a concentration of relatively impermeable evaporite beds and fine-grained clastic strata in the less seismic part of the lake basin; therefore, the authors conclude that a hydraulic connection between the lake water and the deep aquifer system that includes buried faults is needed in the Lake Mead area to cause the release of seismic energy. Where hydraulic connection is prevented by continuous or quasi-continuous upper Cenozoic basin-fill strata of low permeability, as in the eastern basin area, seismicity does not occur. (Woodard-USGS)
W75-09192

8I. Fisheries Engineering

A REVIEW OF THE LITERATURE ON THE USE OF CALCIUM HYPOCHLORITE IN FISHERIES,
Bureau of Sport Fisheries and Wildlife, Cortland, N.Y. Tunison Lab. of Fish Nutrition.
For primary bibliographic entry see Field 5G.
W75-08952

USE OF A SUDDEN TEMPERATURE DECREASE TO REDUCE THE EXCITABILITY OF CHANNEL CATFISH DURING HANDLING,
Southern Illinois Univ., Carbondale. Fisheries Research Lab.
For primary bibliographic entry see Field 5C.
W75-09153

9. MANPOWER, GRANTS AND FACILITIES

9D. Grants, Contracts, and Research Act Allotments

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Identifiers: *Virginia Water Resources Research Center, State policy.

The Virginia Water Resources Research Center was established in response to the need for effective action through sound research on water resources problems in Virginia. The Center serves three purposes: it surveys the state's water resource problems, it sponsors and administers water resources research, and it collects and distributes information on water resources. This publication is the Center's 1974 Annual Report. Seven developments and trends over the past year are discussed to demonstrate the Center's expanding activities and increased effectiveness. Major categories of water resource problems receiving priority research attention are identified. Capsule descriptions of forty-three research projects currently in progress under Center sponsorship are included. Case histories are presented of projects producing information of direct and immediate value in solving important water resource problems, in Virginia and elsewhere. (Fernandez-Florida)
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